The Builder.

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ILLUSTRATIONS.

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Business Premises, Copthall Avenue.—Mr. T. Barnes-Williams, Architect ..... *Double-Page Photo-Litho.*
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The Building Sandstones of Ireland.

VERY little attention has hitherto been paid in this country to the various building stones of the sister island, yet there is a more complete literature on the subject than we possess respecting the building stones of England. Wilkinson,* Kane,† Hull,‡ Houghton,§ Griffith,‖ Kinahan,¶ and others, have produced many excellent treatises on Irish building stones, and all these works are remarkable for their philosophic inception and characteristic thoroughness. We would call particular attention to the recent papers by Mr. Kinahan, last referred to, which, if little accessible in their original form, are decidedly the most complete of them all. The subject is a large one, and we can do no more than dissect a part of it. On the present occasion we shall restrict our observations mainly to the consideration of the sandstones of Ireland which, in remote times, have been, or are at present, used for building purposes. We shall also briefly glance at the deposits of sandstone hitherto untouched by the quarryman, and which could easily be made accessible to the builder with the expenditure of but little capital.

We know that sandstones were favourite building materials with the early inhabitants of Ireland, in spite of the fact that softer and much easier worked stone was frequently nearer at hand. When we reflect on the primitive tools with which the refractory material was wrought into shape, it speaks not a little for the perseverance of these ancient builders, who evidently thoroughly appreciated the enduring qualities of the sandstones, and were careful in the selection of what they used. Whether they intended that their work should stand as monuments to their ability in the remote future, we know not, but certain it is that much of it will remain for centuries to come when the flimsy productions of the modern "competitive contractor" will have decayed into dust—despised and then forgotten.

Slate rocks were called into requisition in those districts where they existed when mortar first began to be used in the country; eventually the sandstones were largely superseded by limestones, which were capable of being worked with greater facility, and lent themselves more readily to delicate mouldings. The bias of the workmen, however, frequently led them to employ stones brought from a distance, even in those districts where equally good stone could have been raised; and this peculiarity is by no means extinct at the present day. Thus, we learn from the researches of Mr. Kinahan, that when the Scotch workmen were building at Muckross Abbey, Killarney, about forty years since, they ignored the excellent limestone of the neighbourhood, and imported sandstone from Chester, that being the nearest place where they could get sandstone similar to that which they were accustomed to work. The engineers of the Ballast Board, when building lighthouses, brought Dublin granite to various localities where stone well suited to the purpose already existed.

Good examples, showing the durability of the sandstones, may be seen in the old doorway of Maghera Church, co. Derry; a doorway at Killeshin, co. Carlow; St. John's-gate, Drogheda; at Boyle Abbey, co. Roscommon; and some dressed work at Mellifont. The last mentioned also shows that the prevalence of mica materially influences the weathering of certain parts of the stone.

Irish sandstones are found in nearly all the geological formations of the island. The most ancient come from rocks of Silurian and Devonian age, but they are not much worked at the present time, by reason of their extreme hardness and the proximity (in some instances) of good limestones. Many of the early structures were made of it, however, and the stone has proved very durable. The Old Red Sandstone, met with about Castlebar, and extending from Newport to Lough Conn, in Mayo, is a reddish-brown sandstone and conglomerate. In the central tracts of Ireland red sandstone occurs in the elevated parts of Slieve Bloom, the Inchiquin, Beruagh, Keeper, and Galtee Mountains. Other areas of the same class of stone occur in the promontory of Dingle, the vicinity of Killarney and Bantry, Kenmare River, Bantry Bay, and in Muntervary, Mizen Head, and Cape Clear promontories. The Old Red Sandstone in co. Cork is, at least, 5,000 ft. in thickness; but the largest area is that which surrounds Cork, Youghal, Dungarvan, and Waterford. The beds in the last-mentioned districts have much analogy with strata of the same geologic age in Pembrokeshire, and, like them, are traversed by slaty cleavage, the angle of inclination of the cleavage to the plane of the strata often varying from bed to bed. In Ireland, the Upper Old Red Sandstone consists of a lower thick series of green, purple, and red grits and slates; and an upper and thinner group of yellowish, or grey, flagstones, frequently suitable for paving purposes. These divisions have also been partly classified with the Lower Carboniferous.

Carboniferous rocks occupy more than half the area of Ireland, but they are largely composed of limestones. Here and there on definite horizons, however, sandstones occur; in the southern part of Ulster and the adjoining part of Connaught a pure arenaceous rock is found in the limestone, or as independent beds. This arenaceous rock is called the "Calp" sandstone, and furnishes the stones now held in the highest esteem by Irish architects and builders. The Coal Measures, as usual, contain sandstones, but, with the exception of those of the Fermanagh series, are not in much repute.

Mr. Kinahan states that in the West Munster coal-fields the sandstones are almost invariably hard, and although they can be dressed on the face of the beds, they cannot be worked across, as they chip and fly at the edges. In places, they produce excellent flags, but to give good joints their edges generally require to be sawn, as they chip on the face if dressed. In the East Munster (Tipperary) and Leinster coal-fields

* G. Wilkinson, "Practical Geology and Ancient Architecture of Ireland." 1845.

† Sir R. Kane, "Industrial Resources of Ireland." 1844.

‡ Professor Hull, "Building and Ornamental Stones." 1872.

§ Rev. Dr. Haughton, "Quart. Journ. Geological Soc.," vol. xviii., and other papers.

‖ Sir R. Griffith, "British Assoc. Report," 1863.

¶ G. H. Kinahan, "Journ. Royal Geological Soc. of Ireland," vol. xviii. 1886-88.

good stones suitable for dressed work are found. In Monaghan and Fermanagh are the well-known Lisnaskea stones; and good flags were formerly sent extensively to the market from the Connaught coal-field.

Sandstones in Ireland of later age than the Carboniferous do not seem to bear a very good character, with the exception of some, of the Triassic period, coming from North Devon, Scrabo, and Dundonald, which are much sought after. Other Triassic sandstones are abundant enough, but they are not of a very durable nature.

We will now briefly describe the chief building sandstones as they occur in the various counties, adopting the classification of Mr. Kinahan, but omitting many geological details, and arranging the counties in alphabetical order.

Antrim.—The Geological Survey Memoir states that the fine beds at Cave House were at one time largely quarried, and shipped to Belfast for building purposes. At Ballyory quarry, near Ballycastle, the stone is very fine-grained and friable, largely made up of grains of quartz, slightly micaceous, and with a few iron spots; it works with facility, but, of course, the blocks containing the iron spots should be rejected. It is light yellow and pink in tint. Certain varieties have been used for bridge-work and in several buildings in the North of Ireland, and have proved to be very durable, but the stone requires to be carefully selected. It is remarkable that in Ballymena, the nearest large town to the quarry, Ballyory stone is not much used, it having been beaten out of the market by the Scotch and Dungannon stones, which are cheaper. Several quarries in red stone, of Triassic age, known as "Red Free," exist in the valley of the Lagan, and near Larne.

Armagh.—Many sandstones occur in this county, but they have not been quarried to any great extent. A fine-grained stone of Carboniferous age is raised at Grange, and was employed in the restoration of Armagh cathedral in 1835; and a conglomeratic bed, near the county town, was formerly used for building.

Carlow.—The Lower Coal Measures in West Carlow contain many fine sandstones, which might be raised for architectural purposes but only one quarry, worthy the name, now exists — namely at Killeshin. The material is of a brownish-grey colour.

Cavan.—Quarries in the "yellow sandstone" formation near the county town have been much drawn from for local purposes; and good building stones exist in the north-western part of the county, but they are not worked to an appreciable extent.

Clare.—At Ballyheigue, near Scariff, a yellowish, ferruginous sandstone is found which was largely employed in the Shannon improvement works at Killaloe. A dark grey stone is raised at Ennistimon, and at Crag and Money Point good flags occur, which have been largely exported to different places along the coast in times gone by. Rather more than thirty-five years since there was a large industry at Killaloe manufacturing these flagstones into chimney-pieces, but the business has long since disappeared. This is another instance similar to those which, on previous occasions, have been pointed out in these columns of the decay of the stone industry of Ireland. The causes of the closing-up of the "Killaloe Marble Works" are not very apparent. As Mr. Kinahan very truly remarks,* "Killaloe is most favourably situated, having command of the greatest water power in Ireland, and ought to be one of the great centres of industry; but for some reason all this great water-power is allowed to remain idle. Prior to 1850 the Killaloe works were a great source of employment, not only in the town, but in the flag quarries on the Lower Shannon, and in various marble quarries, principally in counties Tipperary and Limerick. All these quarries seem to have failed when the Killaloe works ceased."

Cork.—This county has many sandstones of excellent quality, and several quarries exist, but the industry is not as important as it should be. The greyish-green stone from Sherkin Island, off Baltimore Harbour, has been extensively employed in Skibbereen, and is said to be very durable. The greenish stone of Drumcona is also in good repute, and so is the brown freestone of Horse Island. Other good sandstones are found at Glandore, Rahan, and Quarry mountains, near Mallow, Knightfield, Whitechurch, and Youghal. In rocks of Carboniferous age quarries occur, amongst other places, at Coolcoming, Belleview, Shippool, and Ballymartel, the two last-mentioned localities being situated near Kinsale. Speaking of the stones raised on the river Lee, north of Cork, Mr. Wilkinson says that some are yellowish-white, close, having compact quartzose grains, with felspathic cement, and semi-vitreous; whilst others are green, siliceous, close, and dense, but with numerous fissures and bedded portions, the latter causing the stone to fail.

Donegal.—Quarries near Mount Charles produce durable stone of much repute. That from Drumkeelan has recently been used in building the museum and library at Leinster House, Dublin; it is a yellowish-grey material, felspathic, slightly micaceous, with a siliceous, ferruginous matrix or cement. There seems to have been some difficulty in getting an adequate supply, judging from experience in building a bank at Ballyshannon. The greyish-yellow sandstone of Altito, near Donegal, was used as ashlar in Lough Eske Castle. Other stones of a somewhat similar nature are found at Beauwin, Kildoney, near Ballyshannon, and at Dog's mountain.

Down.—The Triassic beds along the valley of the Lagan yield a dark red stone which has been considerably worked for local requirements. The different quarries at Scrabo Hill, near Newtownards produce some of the best-known sandstones in Ireland. The variety is very good, and, as is usual in such cases, the material is variable in quality. The predominant colours are grey, yellow, and red. It has been much employed in the neighbourhood of the workings, and in Belfast; examples in that city are afforded by the Albert Memorial, St. Enoch, Fortwilliam, Sinclair's Elmwood, and Donegal-street churches. The red stone from Dundonald is also used in Belfast and in Dublin; it is very similar to Scotch Annan stone in appearance.

Dublin.—In the city of Dublin, sandstone is largely displayed in the public buildings, but Mr. Kinahan states that none of the cut stone appears to have been obtained in the county, whilst most of it, especially in the buildings erected during the last century, and in the beginning of the present, is English stone. Arenaceous rocks, belonging to the Carboniferous system, have yielded good flagstones, especially in the "Windmill" quarry, Rathgar; whilst local stone is obtained from the lower Coal Measures in the north of Co. Dublin.

Fermanagh. — Near Lisnaskea several quarries of note occur, which produce a cream, yellow, or greyish free-working stone. That from Slush Hill has been used in several buildings in Enniskillen, Clones, and Irvinestown, but the quarry is now closed. The "Geological Survey Memoir" for the district states that good hard siliceous stones may be procured in the Derrygonnell "Calp" area, to the west of Lower Lough Earne—as in the neighbourhood of Church Hill. About Monea they are, in general, massive, with subordinate flaggy beds. Other sandstones are found in the west of the county, where there are several small quarries.

Galway.—Although fine stones occur in co. Galway they are not, at present, much worked. A thin laminated flag, known as "Dunmore slate," was formerly raised at Slieve Dart for roofing purposes.

Kerry.—The Devonian and Coal Measure sandstones were much used in the early Norman architecture in the county; but the numerous small quarries open at the present time merely provide material for local purposes. Fine red stones occur at Minnard, near Dingle, and at Poulawaddra Wood and Tonenane, near Tralee.

Kildare.—Very little sandstone crops out in this county, and that is not exploited to any extent.

Kilkenny. — Many excellent sandstones occur in co. Kilkenny, but their interest is principally historical. Near Carrick-on-Suir, Kiltown, and Coolcullen, yellowish and red stones are raised for local purposes. The celebrated "Carlow flags" are obtained at Shankill, Kellymount, and Conahy. Mr. Kinahan says that the Shankill flags were considered the best. They ranged in thickness from 4 in. to ½ in., and could be raised as large as 12 ft. or 14 ft. square, but in general, they were from 8 ft. to 10 ft. long, and 3 ft. to 4 ft. wide. The trade is not so brisk as formerly.

King's County.—In the neighbourhood of Kinnity, along the north-west flanks of Slieve-Bloom several small quarries exist in Carboniferous age stone, of a cream tint.

Leitrim.—Near Manorhamilton, at Killea, a fine-grained, argillaceous sandstone of varying shades of grey is extensively worked; and several small openings are found near Mohill, and between Dromod and Drumsna.

Limerick.—The well-known Doon freestone furnishes another example of the decay of the Irish sandstone industry. It was especially suitable for staircases, and was largely shipped to England and elsewhere. Many bridges have been erected with the hard quartzose rocks found in the coal-measures of this county; and flags have been worked near Athea and Barna.

Londonderry. — Near Maghera, at Gort-a-hurk, the light cream-coloured sandstone is found, of which the elaborately-sculptured doorway of the ancient church of Maghera is built. A blue stone occurs at Drumard which has been used in Belfast; whilst from the Drumquin, Altmover, and other neighbouring quarries comes the "Dungiven" stone held in high repute in the Belfast district. It is stated to be an excellent material, of light colour, free from iron, very durable, and tools with facility. It has been used, amongst other places, in Coleraine Church, Protestant Church, Belfast; several buildings at Kilrea, and in the Diocesan Seminary, Londonderry.

Longford and *Louth.*—Several sandstones are raised in these counties, for purely local purposes,—some are of fair quality and others are very indifferent.

Mayo. — Flags of large dimensions, of Silurian age, are found between Foxford and Swinford, and in the north-west of the county. Quarries in Carboniferous freestone are at Meelick, near Killala; Westport, and Poulsharavogen, near Swinford,—old buildings in the vicinity of these places attest to the superior quality and endurance of the material. Flagstones are raised in many places.

Meath.—Westward of Kells, near Oldcastle, are sandstones presenting different shades of brown and yellow; and between Navan and Drogheda similar stones have been raised here and there. Carricklick quarry, near Carrickmacross, produces a variable greyish stone, which works freely, and has been much used in the last-mentioned town.

Monaghan and *Queen's County.*—The Carnmore stone in Monaghan, of a yellowish red colour, has been somewhat extensively exploited; and the Lower Carboniferous sandstones raised near Mountmellick, in Queen's County, were formerly much in request; whilst a number of openings exist near Clonaslee, Ballysally, and Cloggrennan.

Roscommon.—St. John's Hole quarry, near Boyle, is interesting from a historical standpoint. The stone is grey and hard, and has been used in great quantities in the neighbourhood, notably at Boyle Castle. Mr. Wilkinson, in speaking of it, says that it "has resisted exposure to the weather well, some of the marks of the tools being still visible." He adds that the quarry was situated in the bed of the river; and in this connexion Mr. Kinahan writes an instructive note to the effect that "This raising of stones

* "Journal Royal Geological Society of Ireland," vol. xviii. (1887), p. 238.

out of the bed of a river or stream seems to have been not uncommon with the early builders, as in different places holes are pointed out so situated, which tradition states were quarries where the stones were procured for adjoining structures." A good example of such a quarry, he adds, may be seen at Kilmacrenan, co. Donegal; not long since this hole was pumped out, and a rude set of steps to the floor of the old working was discovered. Near Castlerea good sandstones have been raised, and also in Slieve Baun, near Roscommon, and other places.

Sligo.—Although this county is by no means deficient in fine sandstones, they are not much drawn upon by reason of the preference given to limestone for building. West of Ballysodare Bay, and in Dromore West, freestone quarries occur.

Tipperary.—Sandstones were largely raised in this county in ancient times, but, although of good quality, they are not much sought after at the present time. Quarries exist in the Devonian rocks at Knockmeeldown and Mount Anglesey; and in Carboniferous at Dundrum, Tinnakilly, Drumbane, and near Roscrea.

Tyrone.—This county produces the best sandstones in Ireland, and they are largely quarried. The majority are of Carboniferous age. The "Calp," especially, yields some beautiful stones; the workings in the vicinity of Cookstown show a cream or blue tint stone, slightly micaceous, open-grained, and having a calcareo-siliceous cement. North of Dungannon, at Bloom Hill, cream and red stones are raised; and the quarries of Gortnagluck and Carlan have provided much building stone for Ballymena, Londonderry, &c. Ranfurly or Mullaghana stone is yellowish, fine-grained, and does not tool easily. It was used, amongst other places, in the Post-office and Northern Bank, Belfast. These materials are known generically as "Dungannon stone."

Waterford.—The Devonian and Lower Carboniferous sandstones are very generally used throughout the county; they are usually brown, yellow, or greenish. Quarries occur near Dungarvan, Lismore, Clonmel, and at other places.

Westmeath, Wexford, and *Wickow.*—The first-mentioned county, being almost entirely composed of Carboniferous limestone, contains no sandstone of any note. In the vicinity of Wexford Harbour shaly sandstones have been wrought, and also at places in Forth and Burgy. The only sandstone worth mentioning in Wicklow is quarried at Glencormick, north of the Great Sugarloaf. It is cream-coloured, fine-grained, and has been much used at Bray, and in the surrounding district.

From the foregoing it will be observed that Ireland is rich in arenaceous rocks, and many of them are of excellent quality. With increased prosperity, and the introduction of a little more capital, the Irish sandstone industry would doubtless be revived. It is a deplorable but significant fact that, whilst suitable building material is found in abundance in the island, a considerable quantity is imported. Surely such a state of things will not exist much longer!

NOTES.

THE coal-miners have had their holiday, and the merchants their harvest at the expense of the public, and now we may look for the reaction. It set in, indeed, some days before the men resumed work, prices dropping (almost as rapidly as they had risen) even while there was hardly a ton of coal being raised in any part of the country. Such, however, had been the activity during the week preceding the stoppage,—particularly in regard to household coal,—that there was actually more coal in the London depôts at the beginning of this week than there was before the stoppage. The resumption of work is delayed in some instances owing to the mines getting out of order in consequence of the refusal of the Federation to allow work of any kind to be proceeded with during the stoppage. With regard to the scheme for working five days a week, it is not anticipated that the masters generally will offer much opposition to its adoption, as the demand for fuel has now fallen to such an extent that there would, in many cases, be some difficulty in finding work enough to occupy the men full time. Probably, if the suggestion had come from the masters there would have been a great outcry; indeed, some difficulty will doubtless be experienced as it is, for this continued voluntary sacrifice of wages is not altogether approved of by some of the men. From Derbyshire, for instance, where there are 33,000 miners, it is reported that many of the men complain of loss of wages, and opposition may develop to the five-days week resolution. The present outlook is most serious in Durham, where the strikers will receive the support of the Federation men in their efforts to resist a reduction of wages, and where some bad feeling is already being displayed.

THE hearing of the Bill of the Manchester, Sheffield, and Lincolnshire Railway Company, for the extension of their line to London, has commenced. It is clear that so far as the extension is concerned it is practically an unopposed Bill. The real fight is over the question of the London terminus. The company proposes to swallow up squares and streets in a very wholesale fashion. When all the facts and plans have been clearly stated, it is really a question for the House of Commons to decide. As the matter is in a sense *sub judice* it would be undesirable to enter into details, but the absorption of a large part of a district of London is a subject not only of vital importance in itself, but is also a matter which must be regarded as likely to become a precedent. For some day, perhaps, the South-Western Railway might wish to locate themselves in the midst of South Kensington. Then, again, there is in close connexion with the terminus, the question of street approaches. A large terminal station must obviously have an influence on the vehicular traffic for a considerable distance. The points will be found probably to resolve themselves into conditions upon which the Bill should be passed; but these conditions seem to be of a character which require discussion from a larger assembly than a handful of members in a committee-room.

THE demolition of the block of buildings near the Rolls Chapel, at the south-east side of Chancery-lane and opposite Carey-street, will, it is to be hoped, result in the widening at this part of the "Lane." This main communication between Holborn and Fleet-street is too narrow for the traffic, and the ground which has lately been cleared should not be allowed to be built over to the same extent as before the destruction of the old buildings. We must also again call attention to the fact that though the new Bankruptcy Court and offices are completed, the access to them for carriages and cabs is very inadequate. There must be a direct approach made from Holborn if persons who have to attend at these buildings are not to be delayed and inconvenienced, since both the Chancery-lane and the Little Queen-street routes are constantly blocked.

RAILWAY passengers are decidedly getting the best of it just now in regard to the overcrowding question. The latest decision in their favour was given at the Birmingham County-court last week, when the Midland Company were sued by a first-class passenger for having inflicted some third-class company upon him against his will. It was decided that the company had no right either to put more than six passengers into a first-class carriage, or to put third-class passengers into carriages of a higher class, without the consent of the occupants; and the complainant was awarded forty shillings damages for the inconvenience and discomfort to which he had been subjected. This gentleman seems to have frequently been the victim of overcrowding, for it appeared from his evidence that on two occasions he had to take refuge in the guard's van in consequence of insufficient accommodation. It was argued, however, that entering the guard's van was his own act, and the Judge held that no case had been made out in this instance. There may have been, perhaps, some difficulty in deciding whether such an act, under such circumstances, should be described as voluntary or not, although it is certain that it would go very much against the grain; but it would be some satisfaction to the plaintiff to succeed on the other portion of his case. The Midland will evidently have to look to their accommodation for this section of their line, while other defaulters in this respect will do well to take warning.

MR. CECIL TORR'S article in the last number of the *Classical Review* (March, 1892) is sure to be the beginning of a smart controversy on a point of importance to all Hellenists. The occasion for the article in question is the appearance of Mr. Flinders Petrie's "Illahun, Kahun, and Gurob," but Mr. Torr directs his polemics mainly against what he is pleased to call Mr. Petrie's "sensational article" in the *Hellenic Journal* for October, 1890. To this article and its great importance we drew attention at the time. Mr. Torr, in his dogmatic fashion, says: "Nobody could take such an article very seriously; but nobody could fairly criticise it at the time, for Mr. Petrie merely stated his results and reserved most of his evidence for publication in his work on Illahun." By an odd coincidence in this very same number of the *Cassical Review* we have evidence that one Homeric archæologist of notably sound judgment does take Mr. Petrie very seriously. In reviewing the English edition of Schuchardt's book on the Schliemann excavations, Dr. Walter Leaf writes:—"It is pure ill-luck that it (*i.e.*, second German edition) should come out just too soon to take advantage of Mr. Petrie's paper in the 'Journal of Hellenic Studies,' which must form the foundation of all the chronology of the Mykenaean period." The lists are set for a tournament of no common interest, and we hope to see Dr. Leaf, as well as Mr. Petrie, break a lance.

THE Prussian Diet has granted the ten million marks asked for by the Government towards the cost of a new Berlin Cathedral, and the House has made a start by voting the first 300,000 marks necessary for the preliminary works on the proposed site. The grant of the ten millions has been made on condition that no extra sums shall at any future date be asked for, that the money be voted in smaller sums, according to the requirements, and that a Board of Works standing under the sole control of the Emperor's Master of the Royal Household Affairs carry out the building, and bear all responsibility in relation to it. As to who will have the future responsibility of keeping the building in condition when it is in use, nothing has been decided. In the course of the discussion that took place before the voting, Herr Richter, the Leader of the German Liberals, opposed the grant. He considered the financial state of the country too bad at present to permit of such luxuries as cathedrals, whilst urgent necessities were being crossed out in the General Purposes Budget; he also reminded the Government that the number of places of worship in the country was considered to be far too small in comparison to the population, and that the sum asked for would cover the expense of erecting a number of these buildings. He then went on to question the House as to who was to guarantee that such money as they were asked to vote would not be used for the erection of a public eyesore, and that the Emperor's despotic *sic volo sic jubeo* would not also be used in this matter. If the House was going to acquiesce in the Government's demand, the right of having a

hand in the selection of architect and design should, at all events, be reserved. He finished by pointing out that the means of the reigning Hohenzollerns were not so small as not to permit the Emperor to build a cathedral on his own account, if he thought fit, without making the taxpayers' burden a heavier one than it was already. Another member observed that the discussion would not have taken so disagreeable a turn if it had not been for the selection of the unpopular design and architect. The end of the matter was as above stated, that the country will have to pay its money towards the cost of an erection, the design of which is decidedly unpopular, without any power of interference on the part of their representatives.

THE Church of St. Gervais, some of whose fine old windows, and images in the baptistry, narrowly escaped total destruction by an explosion with felonious intent upon the Lobau barracks, is one of the most noteworthy in Paris. Conspicuous for its range of flying buttresses, it stands behind the Hotel de Ville* and the (former) Caserne Napoléon. The fabric was completed in 1420; a Classic façade by Salomon de Brosse was added in 1616. The windows, originally filled in by Pinaigrier and Cousin, had already suffered much. One, in a chapel on the south side of the choir, representing the "Judgment by Solomon," was set up in 1531. The older glass in the Lady Chapel, restored in 1845, is ascribed to Pinaigrier. Here were buried Scarron, after whom the Chapelle Scarron, with late seventeenth century decoration, is named; P. de Champagne, painter; the Chancellor Letellier; and Madame de Maintenon's husband. The grotesque carvings of the choir stalls are of the sixteenth century. St. Gervais is clearly depicted in Mr. H. W. Brewer's "View of Paris in Francis I.'s Time," published by us on January 5, 1889.

SOME repairs, undertaken by the Burial Board of St. Margaret's and St. John's, Westminster, to the churchyard of the former parish, supplement the more extensive alterations that were made ten years ago. The present turf and Eureka-paved pathways are a great improvement upon the unsightly area of cracked and sunken tomb-stones. The latter were re-laid some feet below the surface, and the only stone now visible is one opposite to the church's new western porch, which is inscribed "T H." St. Margaret's grave-yard is crowded to excess. The Report by the General Board of Health upon a scheme for Extramural Sepulture (1850) contains some forcible strictures by Dr. Reid on its insanitary condition. In the churchyard were buried Hollar, in a grave, says Aubrey, near the north-western corner of the tower (1677), and Dr. Hickes, author of the "Thesaurus" (1715). After the Restoration, they dug a pit for the remains, taken out from the Abbey, of Admiral Blake; his bust, by Baily, was put in the Shire-hall of Taunton, his native county town, about thirty years since. Since the date (August 29, 1885) of our illustrated article upon the artistic features of this church, which in antiquity of foundation ranks next to St. Paul's and the Abbey, two coloured windows have been set up. One was presented by Mr. G. W. Childs, of Philadelphia, in memory of Milton's marriage to, and the burial of, his second wife, in the church.† Another, of three lights, by subscription, in honour of Blake, designed by Mr. Edward Frampton. At the ceremony of unveiling the latter, on December 18, 1888, Archdeacon Farrar is reported to have said it formed the thirteenth window placed in the church to the memory of great men since he became rector. The lines on the Caxton, Milton, and Blake windows are by Lord Tennyson, Browning, and Mr. Lewis Morris respectively. The original organ, by "Father" Smith, was sold soon after his death. In 1882, the then organ was rebuilt and enlarged by Messrs. W. Hill & Son, and enclosed in an oaken case designed by Mr. A. G. Hill, F.S.A. It is now proposed to set up here a stained-glass window to the late Mr. W. H. Smith's memory.

* For description, with illustration, of the old Hotel de Ville see the *Builder* of January 26, 1889.

† Buried on February 10, 1658: a gift to the poor by the poet's daughter is cited in Mr. Wm. Bardwell's "Brief Historical Narrative of the Royal Church and Parish of St. Margaret the Martyr," *circa* 1878. The marriage took place on November 3, 1656.

AT the sale by auction on the 18th inst. of the Farringdon-market site (for 68,100*l.*) the question was raised whether portion of the area covers a disused burial-ground. There seems to be but little doubt that this is so. For the market buildings, between Shoe-lane and Farringdon-street, was cleared a space whereon stood (reckoning southwards from Plum Tree-court) Mellin's-rents; St. Andrew's, Holborn, Workhouse, in the lane, and just opposite to Robin Hood-court; Brew House-yard; Cross-alley; George-alley; the "Rose and Crown"; and Love-court. A graveyard belonged to, and lay behind, the Workhouse, and is that wherein Chatterton found a pauper's burial. Close by, southwards, between Stonecutter-street and Harp-alley, stands another disused graveyard, which belongs to the parish of St. Bride.

THE collection of paintings by Mr. Whistler, at the Goupil Gallery, consists mainly of works which have been exhibited before in London, and seems to have been intended as a kind of demonstration in honour of the fact that his portrait of his mother has recently been acquired for the Luxembourg Gallery. Mr. Whistler is always amusing on these occasions, and in his catalogue he quotes after each picture some of the contemptuous remarks which have been made about it by various critics, and winds up with a quotation from the *Chronique des Beaux-Arts* in praise of the Luxembourg purchase as "destinée à l'éternité des admirations," with the object of showing what imbeciles are the English critics who have scoffed at Mr. Whistler's productions. We fear the argument will not bear much examination. In the first place the Luxembourg picture is one of the very best Mr. Whistler ever painted, and has been recognised as such by many who would not stand his nocturnes and other vagaries; and in the second place the work exactly hits the most recent French taste in painting, and therefore naturally gets rather extravagant praise from a French critic. This will not prove that all the things in the Goupil Gallery are worth the same praise. In regard to the portrait of Miss Alexander (23) Mr. Whistler is kind enough to put on record our own criticism, "There is character in it, but it is unpleasant character. Of anything like real flesh tones the painting is quite innocent." We are obliged to him for giving prominence to a criticism which we believe the majority of people who know anything about painting will admit to be a completely fair and just estimate of it. Among works exhibited are some that we can admire more unreservedly, especially the "Dame au brodequin Jaune" (why this affectation of French in an English exhibition?), a full-length portrait of a lady just in act to walk away from the spectator, showing her profile over her shoulder, which we have before remarked on for the admirable indication of figure and movement given in it. The exhibition as a whole is half amusing, half vexatious,—the work of one who might have done great things in his art if he could have troubled himself to take it seriously.

CARLISLE ARCHITECTURAL AND ENGINEERING ASSOCIATION. — The usual fortnightly meeting of this Association was held in the Town Hall on Tuesday last, when a paper was read by Mr. J. W. Smith, the Sanitary Inspector for the city, on "The Sanitary Arrangements of Public and Private Buildings." The paper contained some good, practical information as to matters of house drainage.

ROYAL INSTITUTE OF BRITISH ARCHITECTS:

BYZANTINE ARCHITECTURE.

THE tenth general meeting of this Institute for the present session was held on Monday evening last, Mr. J. Macvicar Anderson, President, in the chair.

The late Professor E. A. Freeman.

The President: Gentlemen, I am sure you will all mourn with me the loss of a distinguished man, Dr. Freeman, Professor of Modern History at the University of Oxford. Dr. Freeman was, as you are aware, an Honorary Fellow of this Institute, and has been so for many years. Whatever may be the exact position which posterity may assign to him as a historian and as a prolific writer of the English language, we at all events will all agree in deploring the removal from our roll of members of so eminent and distinguished a man. As architects we are more particularly interested in his loss from the circumstance that, prolific as were his writings, the first work that he published, in 1849, was a "History of Architecture," followed, in 1850, by his "Essay on Window Tracery," and in 1851 by his pamphlet on "Llandaff Cathedral." I am sure, gentlemen, you will all mourn with me the loss of our distinguished Honorary Fellow.

The Examinations.

The President next made what he called an *interim* report on the Institute Examinations. He said that eighty applications had been received to be admitted to the Preliminary Examinations, seventy-four of which were new applications, six being applications from candidates who had been relegated to their studies on previous occasions. Of the total of eighty, twenty-nine were exempted, in accordance with the rule, and were admitted as Probationers; of the remainder, thirty-six had been examined in London and fourteen in Manchester. The results of this Examination were not yet known, the number of papers to be dealt with by the Examiners being so large. An Intermediate examination had also been held, at which twenty-two Probationers presented themselves, out of twenty-five who applied; of these, thirteen had passed, the remainder being relegated to their studies for a period. The Examiners reported that "the testimonies of study" submitted in this Examination had been of high merit, particularly those of the non-metropolitan candidates. The names of the successful candidates in this Examination were, in order of merit, as follow: — Crompton, W. E. V., Bradford; Coussens, H. W., Hastings; Stratton, A. J., East Sheen; Vercoe, A. W., London; Phillips, J. St. J., Belfast; Clark, J. P., London; Marchant, R., Sutton-at-Hone, Kent; Davis, E. R. O., Leicester; White, E. A., London; Gordon, T. W., Nottingham; Parkinson, F. J., Blackburn; Cotton, P. P., London; and Kendall, F. K., London. These gentlemen were now qualified for registration as Students of the Institute, a non-subscribing class of members now numbering forty-one. For the Examination in Architecture, which would commence on Monday next, March 28, there had been seventy-one new applications received from candidates,—a larger number than had ever before applied at one time. In addition, twenty-one candidates who had been relegated to their studies on previous occasions had also applied to be admitted to the examination, making a total of ninety-two; but, the applications of eleven of the new candidates having been disallowed, by reason of their probationary work not being equal to the requirements of the Board of Examiners, the net number of candidates to be examined was eighty-one,—sixty-six of whom would be examined in the Institute Rooms, and fifteen in Liverpool. He ventured to think that the figures he had quoted were eminently satisfactory.

A New Theatre at Amsterdam.

Mr. J. M. Brydon said he had been asked by Mr. Jan Springer, a well-known architect at Amsterdam, to offer, for the acceptance of the Institute, a complete set of the working plans of the new theatre now being erected in that city. He thought they would be found very useful and interesting. The theatre itself was a very important structure, costing about 100,000*l.*, and was built entirely on piles. The whole of the construction was shown in the most minute way, and he though that the drawings would be found very well worth study.

The President said he was quite sure the meeting would give its thanks by acclamation to Mr. Jan Springer.

Byzantine Architecture.

The President, in calling upon Professor Aitchison to read his paper on Byzantine Architecture, said it was with great gratification that they all welcomed their old friend and colleague, Professor Aitchison. It was particularly kind of him to undertake to give them a paper so soon after the arduous labours of his course of lectures at the Royal Academy.

Professor Aitchison then read his paper, of which the following is an abstract:—In the author's introductory remarks he said architects were now interrogating every architectural monument to discover how building had been converted into architecture in every country in the world, so that they might make the step forward towards a style characteristic of modern civilisation. In Byzantine architecture was to be seen the gradual adaptation of the plans of antique buildings to the ritual of a new faith; the universal adoption of the dome; the successive devices by which the equilibrium of the dome was at last attained; and the new æsthetic problems solved. In studying Byzantine architecture, two difficulties were encountered: the date of its beginning and its chronological sequence. He had taken the dedication of Constantinople (330 A.D.) as the first, although the buildings erected then were of Roman architecture, and probably designed by Roman architects. Having referred to the buildings erected in the time of Constantine, the author said the greatest benefit the Emperor had conferred on architecture, beyond his buildings, was to enact that all persons in North Africa and Italy should be freed from taxes if they allowed their sons of eighteen years of age and of liberal education to be brought up as architects. As to the sequence in date of Byzantine buildings little could be traced from Constantine's death to the days of Justinian, because the study of Byzantine architecture had been neglected; but if masterpieces were again to be erected old ones must be studied, and one masterpiece of the world was the Sta. Sophia of Constantinople. From a description, by Eusebius of Cæsarea, of an early Christian church, it would be seen that the churches originally faced east and the priest faced the congregation; the right and left sides of the altar were the priests' right and left, the right or south aisle being for men, and the left or north for women. In the fifth century the orientation was reversed, the priest standing with his back to the congregation and facing east, although the sides of the altar remained as before. The pure basilica type, in the form of a circus, did not, however, find favour except in Italy and the West. When domes on pendentives were first used was not known; M. Dieulafoy and others had discovered that the ancient Persians used egg-shaped domes over square chambers, carried by a pendentive pierced by a squinch; and M. Choisy was of opinion that those found at Serbistan, Firouzabad, and Ferachbad were of the days of the Achæmenides (about 800 B.C.). A pendentive, not quite regular in form, was found at Caracalla's Baths (211 A.D.), and mentioned by Ware in his tract on vaults in 1822. It was generally agreed, however, that the first great dome on four pendentives was that of the great Sta. Sophia; and next to Sta. Sophia the most important building, for its influence, was the Church of the Apostles at Constantinople, eventually destroyed by Mohammed II. for his mosque, but said to have served as the model for St. Mark's at Venice and St. Front at Périgueux. The earlier buildings of Central Syria seemed to have had considerable influence on Byzantine architecture. After the building of the great Sta. Sophia, the constructive problem to be solved was making domes on pendentives safe. The original dome of Sta. Sophia had fallen twice, and, though rebuilt with a higher rise, was not absolutely secure. The weakness of the abutments to the dome and pendentives was mainly on the north and south sides. No other big dome was to be found in Byzantine work; in minor and later examples barrel-vaults took the place of the arches. M. Choisy had pointed out that the dome of Sta. Sophia at Salonica was abutted by vaults one-third the diameter of the dome, but that the church was probably two centuries later than its prototype. The church to the Virgin at Salonica, called by Texier and Pullan St. Bardias, has been looked on as an early specimen of a dome on a drum, but the date of its dedication was 1028 A.D., and its arrangement also pointed to a late date, for the plan showed three apses at the east end, with a large central dome supported on columns and surrounded by four small domes. A similar arrangement of five domes was found at St. Nicholas at Myra, which was nearly identical in plan with St. Theodore at Constantinople. In Greece the squinch or conch seemed to have been preferred to the pendentive. Most of the peculiarities in churches after the building of the great Sta. Sophia were structural ones to prevent the spread of domes on pendentives, and the use of drums added to the weight; they showed, however, that the Byzantines had learnt to build domes securely. The æsthetic devices of early Byzantine work were not easy to describe, for most of the columns came from temples. The slips of entablature over the columns in the groined halls of the Roman baths were roughly imitated by a block put over the capitals; these blocks were universal up to a certain period. It was also possible that the treatment of the arcade over the Porta Aurea at Diocletian's Palace was a common practice. Besides the cup, cushion-shaped, or cubical capitals, the turning of the apophyges of the columns into bands was worthy of note. Æsthetically, the outsides of the buildings appeared to have received little attention, although some fronts were ornamented with blind arches or open arcades, and in later work bricks in zigzags, or rude imitation of the Greek fret, were used. The profiles of Byzantine work were tame and commonplace, with no proper æsthetic sequence in the mouldings. The interiors were splendidly decorated after the Roman manner, which the author described. The five Imperial palaces at Constantinople all joined together were as curious in construction as they were splendid in internal decoration. As the Byzantine Empire shrank away, the position of these palaces was found to be too exposed to attack from the Bosphorus, and another was built at Blachernæ, on the Golden Horn. The great tank called the Cistern of Pholoxenus, believed to be of Constantine's time, was interesting as exhibiting how the Byzantines built for pure utility. The peculiarities of Byzantine construction were given in M. Choisy's work, *L'Art de bâtir chez les Byzantins*, and was most original and interesting. The vastness of the interior of Sta. Sophia, the author considered, was most striking, and was greatly aided by one having to go down the narrow narthex, through the Imperial door into the main edifice. In the course of his description of the interior, Professor Aitchison drew special attention to the lighting, as matter he deemed not sufficiently thought of in modern buildings. There were forty windows round the base of the dome; the aisles on both floors were flooded with light, and there were many windows in the north and south clearstories. The decoration also was splendid; the lower part of the walls panelled with precious marbles, the sprandrels of the upper arcades and friezes inlaid with magnificent patterns on black and white marble, superb monolithic columns of porphyry and verde-antique and gold mosaic combined to produce a dignified and superb magnificence. The Professor concluded his paper with a reference to the present age, perhaps the most marvellous the world had seen, and said architecture had made great strides, and architects were bestirring themselves to make greater. What seemed, however, to be overlooked was that architecture was a structural art, and that all that architects could tell was by building; yet very few seemed to thoroughly acquire the art of construction. As a nation, the English could not pose like the Greeks as lovers of the beautiful; but they were not so far removed from the Roman character that they need despair of producing the grand and the dignified. Success was only to be achieved by the united and continuous efforts of many for generations. Noble architecture could not be looked for until there was a passionate desire for it among the people, devotion in the architects, and the opportunity of acquiring perfection by a long series of monuments to one noble purpose.

The President, in inviting discussion, said that not only did the valuable paper to which they had listened bristle with information interesting to architects, but it was occasionally enlivened by characteristic touches of what he would venture to call that Aitchisonian humour so familiar to them all. The Professor was also particularly deserving of their thanks for the very complete way in which he had illustrated the paper by means of drawings and plans.

Mr. R. Phené Spiers, in moving a vote of thanks to Professor Aitchison, said he had had the advantage of visiting Constantinople and of seeing Sta. Sophia; there was no building in the world which gave an internal effect equal to that which one obtained on entering that great church. Professor Aitchison had brought before them the various features of the interesting style of which he had spoken, and he had also drawn a moral. He was glad to say that the advice contained in his moral was carried out to a certain extent in the French school, where, according to his recollection when he was a student at Paris, the Mosque of Sta. Sophia, as illustrated in Salzenberg and in Reynaud' *Traité de l'Architecture*, was frequently referred to by them. In fact, the new Greek style in France was based much more upon Byzantine than upon Greek elements. He therefore cordially endorsed the Professor's remarks, as he did not know that there was any style which it would be of greater advantage for a student to begin to cut his teeth upon, if he might so express it, because of the great simplicity of its masses and the exquisite beauty, as he thought, of its detail. He confessed that he should have liked to see a little longer duration given to the Byzantine style. The Professor had fixed the period at 1123 years—from the time of the removal of the Empire to Constantinople to probably its being taken by the Turks; but he thought it would be well to direct the attention of students to the fact that the elements of Byzantine art existed for centuries before that, in Central Africa and elsewhere, and that we might go back another couple of centuries to find some of its earliest features. As a matter of fact, curious as it might seem, by bringing all his Roman architects to Constantinople, Constantine really retarded the development of the Byzantine style for probably half a century. It was a singular and peculiar judgment on him that of all the works which he erected at Constantinople by the hands of Roman workmen, not a single one remained, and it was only in the cistern of the 1,001 columns, and in the Yerebatan Serai, both of them executed by Byzantine workmen, that we found two examples of his work existing at the present day. Constantine would have done better if, instead of being in such a hurry, he had trusted to those Eastern workmen who were the builders of that magnificent system of vaulting which the Professor had brought before them. The Neo-Byzantine style was continued in Russia till nearly the end of the seventeenth century, so that instead of 1123 years about fifteen centuries would be more correct. In a paper which he (Mr. Spiers) read before the Institute some months ago, he attempted to prove that the theory of M. Dieulafoy as regards the Palaces of Serbistan and Firouzabad in Persia was illusory, but the Professor was of a different opinion.

Mr. Alexander Payne seconded the motion, and said it always seemed to him that the period of Byzantine architecture was perhaps one of the most original periods of architecture that we had in the whole list; and when one came to consider why it was so original, he thought the reason was not far to seek—which was that the whole needs of Christendom then were quite different from the needs that had gone before. The old Roman Empire had fallen, and the architects had to work out a new problem altogether. Hence we had that extraordinarily interesting period of architecture. It always seemed to him that the real birth of the style was in Syria. In the Marquis de Vogué's book,—a book not well known except amongst architects,—one saw almost all the types of the churches that were to be found in Constantinople; and when one came to Constantinople one came to perhaps absolutely the most interesting architecture one could find. There was a great deal more to be found out in Constantinople than was known.

Professor Kerr and Mr. Loftus Brock having supported the vote of thanks, the President put it to the meeting, and it was heartily carried.

Professor Aitchison having replied, and Mr. E. Wyndham Tarn having made a few supplementary remarks, the meeting terminated with the announcement that the next meeting of the Institute would be held on Monday, April 4, when Mr. Starkie Gardner would read a paper on "Wrought-Ironwork of the Renaissance Period."

SOME RECENT DEVELOPMENTS IN THEATRE-PLANNING:

ARCHITECTURAL ASSOCIATION.

THE ordinary fortnightly meeting of this Association was held on the 18th inst., in the Meeting Room of the Royal Institute of British Architects, 9, Conduit-street, Mr. F. T. Baggallay, the President, in the chair.

Mr. F. T. W. Goldsmith, junior honorary secretary, announced a change in the date of the *soirée*, which is now fixed to be held on May 6, and not on the date mentioned in the "Brown Book."

Mr. Goldsmith further announced that the next Visit would be made on April 2, to the new South London Ophthalmic Hospital, St. George's-circus, by permission of Mr. Keith D. Young, the architect.

Mr. Goldsmith also proposed a hearty vote of thanks to Sir Arthur Blomfield for allowing the Association to visit the Church of St. Saviour's, Southwark, on the 5th inst. The vote of thanks was carried by acclamation.

The President then called upon Mr. E. A. E. Woodrow to read the following paper on "Some Recent Developments of Theatre-Planning":—

When the Committee of the Association honoured me with the request to read a paper on theatres to-night, I was asked if I consented to send the title of the paper to the secretary by return of post, as the Brown Book was ready to go to the printer's. In my haste to obey and anxiety not to delay so important a publication as our Brown Book, I pitched upon the title of "The Planning of Theatres," thinking that wide enough to cover any ground; but when I seriously sat down to prepare for this evening, I found I had committed myself to a task quite impossible to fulfil within the limit of time allowed. In fact, if I had attempted to speak at all fully on theatre-planning, it is probable that I should have been left here till midnight reading my paper to empty benches. The feelings I experience on finding out this may, perhaps, have been also felt by some of you who have had similar commands from our committee. On wondering how I was to overcome this dilemma, it occurred to me that I had better confine myself to recent developments and improvements in theatre-planning, but I fear I can only touch upon the fringe of even this section of my subject. Through the kindness of several gentlemen, I am enabled to-night to bring before your notice several drawings of theatres that have been erected in London during the past few years. It will be my endeavour to trace from these drawings some of the recent developments in theatre-planning. I think it will be of more practical use to us, as members of the Asssociation, to spend the evening studying the plans of buildings built, or being built, than to deal with any ideas for theatre-constructing that exist only on paper, and have not undergone practical test. The great difficulty the student in theatre-planning has to surmount is to learn all that is wanted in and about a theatre; and unless he has had the advantages of seeing the nightly working of the front of the house, as well as of the stage, it is quite impossible for him to design a theatre that will meet the requirements of a London manager. Theatres have to be built to pay. It is a notorious fact that the same play may be a great success in one house and a perfect failure if produced in another. The theatre must be chiefly designed for the particular and special business that the manager intends carrying on therein, although, with changes of fashion and fortune, there *must* be some slight changes of the class of entertainment. I cannot quote a better example to illustrate my meaning than the special arrangements made by Mr. Phipps when he reconstructed the Haymarket to meet the demands of the class of performance given at this house and the class of people frequenting it. Large sums of money are required to mount a Haymarket piece; Mr. Bancroft, therefore, decided to abolish the pit, and fill the whole of the ground-floor of the house with high-priced seats. On the first night the experiment looked like failing, as loud cries of disappointment came from the exalted pit circle; but experience has proved that architect and manager were right in arranging the auditorium as they did. The same arrangement of seats would, however, be fatal to such a house as the Grand Theatre, Islington, the Olympic, or the Adelphi, where the large pit is looked upon as the mainstay of the house. The President of the Royal Institute of British Architects, in his excellent address this year to students, said that "a perfect plan is, and can only be, the result of the thoughtful study of every principle and every detail." It is necessary to find out all that is wanted, and to provide for such wants. To again quote Mr. Macvicar Anderson:—"It is impossible to produce a satisfactory result without practical knowledge of the requirements." . . . . "A plan to be good must be simple."

Site.—The first point which we should consider is, what is a desirable site for a theatre? and in endeavouring to answer the question we shall do well to ascertain what are the regulations enforced in other countries with regard to sites for places of public entertainment. In Austria, theatres holding more than 600 people must be perfectly isolated; those with a seating capacity for less than that number may have the back wall abutting on other houses. In St. Petersburg, there must be an open space on every side, with doors and windows upon all four sides. In Brussels, every theatre must be separated from adjoining premises by an open space or by brick walls. In Italy, perfect isolation is insisted upon; and in Paris, theatres that are detached must have a clear space of at least 9 ft. 10 in. to divide the theatre from neighbouring houses; where they are attached, there must be an independent wall within the theatre 9 in. thick, to protect the party-wall. From this it will be seen that on the Continent isolated sites are required. Such a site is undoubtedly the most desirable, but there is one serious drawback,—the cost. It must be remembered that on the Continent there is "State aid" to assist theatrical enterprise, but that in England it has to be carried on entirely as a private speculation. The New York regulation is a good one: the front must be on the public way, and open spaces at least 8 ft. wide must be left on both sides, from the line of the proscenium wall, the full length of the auditorium. It is seldom in a city like London that the chance offers itself for an isolated site; indeed, it is only when there are important street improvements that theatres such as the Royal English Opera House can be built within the given radius in which the theatres can be made to pay. There are a few cases where houses have been successful outside the centre of the Strand and Haymarket; for instance, the old Prince of Wales in Tottenham-street, made famous under Mrs. Bancroft's management; but there are few managers who would to-day care to risk such an experiment and start a theatre beyond the fashion-bound limits of the West-end. By the aid of street improvement an isolated site was obtained for the Shaftesbury Theatre, but the Savoy site was formed by pulling down a whole block of buildings. The insurmountable difficulties in acquiring perfect isolation in London renders it necessary to make the best of what can be got. How this difficulty has been overcome in some of the new theatres now in course of construction will be seen from the plans of the new theatre in Cranbourne-street, where two sides and part of a third are on public ways, and the new theatre in St. Martin's-lane, where Mr. Emden has so designed the theatre that above the ground level there is an open area or passage-way left all round the building. The drawback to perfect isolation is the prohibitive cost of the land; but a theatre must of necessity be a costly building; a cheap theatre is sure to be a dangerous one. The advantages of isolation are that the risks from fire and panic are greatly reduced. There is not the same danger from surrounding property; the exit passages, staircases, and corridors can be made shorter; and deliver into four different streets. The old-fashioned plan of buying a house in the main thoroughfare, and a plot of vacant land some distance in the rear on which to build a back-yard theatre, reached by a tunnel, is no longer permissible. Theatres on cramped sites hemmed in on all sides, with a narrow frontage to the principal street, sufficient only to carry a flaming gas device, are things of the past. Nearly all the plans before us show that a site of oblong shape is best adapted to a theatre. The Lyric, however, is an example of what can be done on an irregularly-shaped plot of ground. A very clever arrangement of the auditorium is displayed by Mr. Phipps in the planning of the Gaiety, on a site of most irregular formation, but with exits into four different streets. We have before us examples of one of the greatest modern improvements and economy of space if we look at the drawings of the Savoy, Lyric, the Garrick, Cranbourne-street, and St. Martin's-lane theatres. In all these cases it will be observed that a limit to the height of the building is obtained by sinking the pit below the level of the pavement, thus placing the back of the dress-circle on a level with the street. The many advantages of this arrangement do not, perhaps, assert themselves at first sight. The distances to be travelled by the various sections of the audience are equalised; the gallery and upper-circle have shorter staircases; the dress-circle is on the street level; and the pit and stalls have but a few steps to the exits. In the case of the Savoy, the sloping site is taken advantage of. It has been argued that a pit below the ground level must be dangerous, but surely people are less likely to fall ascending than descending a staircase. There is another great advantage in reducing the height of the building above the ground. It tends to facilitate the extinction of fire by the brigade, and renders the fire-escapes of greater value in their work of rescue. The pit of a theatre, if not below, should be on the ground level. I do not think any room or hall where large numbers of people congregate should be built over and above other premises, as it only augments the dangers of fire, and needlessly adds to the height. It is certainly unwise to rob the space which is most valuable for exits by building shops or cafés as part of the scheme, on the ground floor of a theatre. A theatre should be a theatre pure and simple. Even with every precaution enforced that is known to man, there must and will be danger from fire and panic; and dangers arising from other sources should not be added thereto. The passage of smoke to the theatre from a fire in such a shop or restaurant, would be sufficient to cause a panic. There is undoubtedly a great temptation in making the largest return for the outlay on the building, and the rents from shops in the vicinity of popular playhouses assist to swell the profits.

Exits.—It is clearly the duty of the architect to design his building so as to reduce the chances of panic to a minimum, and one of the chief provisions to this end is short and unobstructed exits. Everything in and about a theatre should tend to make the audience have confidence in their own security, and give them a feeling that, should anything happen, they would be able to help themselves without causing injury to others. Where people feel or think they are safe, the chances of danger are small. As better sites have been acquired, better designs have naturally followed. Simplicity in the plan, and uniformity in the two sides of the house tend towards the solution of the difficulty, as seen by the plans of the Shaftesbury Theatre designed by Mr. Phipps. Thus, where there is a pit entrance on the one side, a pit exit will now be found on the other; where there is a gallery staircase on the right, a gallery staircase is on the left, and so on for each tier or division of the audience. Every such division is provided with two separate exits leading directly into the street. Such is the London theatre of to-day. People, as a rule, naturally desire to leave a building by the door by which they enter, and it seems it is only by making the two sides of a theatre alike that the public will find the exits provided. The audience should be taught the way out of a theatre by habit; to speak of "alarm exit," "fire exit," "exit in case of need," is only to encourage nervousness. The suggestions of danger should never be breathed in a building where human beings are packed. I believe that printing a key-plan on the programmes would greatly assist many visitors to theatres in acquiring confidence and self-possession, and learning the way out. The use of automatic panic bolts on exit doors is undoubtedly a great boon, as it renders them always available to the public.

Entrances.—There is a great deal to be said with regard to the manner in which the pit and gallery of a theatre are entered, and there is much to learn from our Continental neighbours, both as to the arrangement of the entrances and the way in which to enter them. Mr. D'Oyly Carte was, I believe, the first to introduce the *queue* system to a London pit, an example which has been followed at the Lyric, Shaftesbury, and Royal English Opera House, and within the last month, I believe, at the Gaiety. At the Shaftesbury you enter by a narrow passage which discharges into the main corridor after you pass the pay-box. A similar

arrangement is contemplated at the new Cranbourne-street Theatre. This allows the whole width of the main passage to remain free for exit at all times, as no obstructing barrier or pay-box is needed. The arrangement shown on the above-mentioned drawings obviates the necessity for barriers, and allows the public to stand in *queue* to await admission one by one, and prevents the scrimmages seen nightly at most pit and gallery doors,—a state of affairs that prohibits a visit to the play to many an one who cannot afford more than 2s. 6d. for admission, and who has not the courage to face the fighting mob which assails the houses where popular plays are running. Were it possible to adopt the *queue* at all theatres, those who desire to follow the example of the lady who took up her stand, or rather her camp-stool, at the Lyceum pit-door at ten in the morning for admission to the first night of "Henry VIII.," could spend the day with just a degree more comfort than that lady could have done with the pressure of a pit crowd behind her. The wonder is she survived to tell the tale. I think that much of the excitement created by the struggle to enter a theatre is retained during the whole evening, making the audience highly sensitive to alarm.

Staircases.—One feature of the old theatre seems to have completely disappeared in the theatre of to-day. I refer to the grand staircase, such staircases as are found at Drury-lane, Covent Garden, and Her Majesty's. The principal staircase at the Royal English Opera House is the only attempt in theatres of the last few years to create such a special feature in the interior. One has not far to seek to find the reasons for the change. With the pit sunk below the ground, and the dress-circle on the ground level, there is no demand for such a luxury. Much space is therefore saved, for a staircase of ordinary proportions, as a rule, leads to the upper-circle and saloon on the first floor level. From an architect's point of view one cannot help regretting the loss of this grand staircase, with the spacious vestibule and crush-rooms; but the demands of to-day are for small theatres not requiring such adjuncts. As to the width generally allowed for the ordinary staircase, it has been found that 4ft. 6 in. is sufficient for 400 persons, with an additional 6 in. in width for every additional 100 persons to be accommodated. There should, however, be a limit to the width, as a staircase too wide is as bad as one too narrow. Beyond a certain width those occupying the centre obtain no support either directly from the handrails, or indirectly by holding on to those who grasp the handrails. Six feet wide is sufficient to allow four persons abreast to go up or down, and should the numbers accommodated in the house require it, a third staircase should be provided in lieu of a greater width. Every division of the audience should have at least two staircases leading to the street. For economy of space two staircases are frequently constructed within the same containing walls, as the new upper circle and gallery exit staircases at the Gaiety. Long, straight flights of steps are bad, as they do not afford the rest on landings required in ascending or descending. Too few steps in a flight are as bad as too many, there should not be more than twelve or less than three. Single steps, or steps at half landings are certain stumbling blocks. Of course there should be no winders, and the steps should be supported at both ends upon brick walls carried up to the roof. The risers and treads must be uniform throughout. No exit staircase should serve two tiers, or have pass doors leading from a tier below, through which any stream of people would be likely to enter and impede the progress of those at a higher level. With regard to landings, they should never be less in length than the width of the staircase. The more rest they afford the better.

The Auditorium.—Returning once more to the drawings of the several new theatres, which we have had lent us to-night, we find that by the recent development of planning and construction the audience have been relieved of the numerous columns, which were ever a cause of annoyance and an obstruction to the view of the stage from several seats in each tier. It was the constant cry for the abolition of these obstacles that first gave birth to the cantilever construction now almost universally adopted in theatre-building. I believe I am correct in saying that the Alhambra was the first house constructed in this manner, and I am able to bring to your notice the details of this construction, as well as the general plans of the excellent auditorium of this house and its rival, the Empire. Those members of the Association who took advantage of the visit to the Royal English Opera House during its construction will remember that these cantilevers were tied into the back walls of the theatre; projecting from these walls, they were connected by girders, making a perfect cobweb of steel-work upon which to build up the fireproof construction of the tiers. The drawings of the ironwork of the Royal English Opera House, kindly lent me by the Horseley Company, and of the Garrick Theatre, and the diagrams of fireproof construction, lent us by Mr. Emden, will convey more to your minds of the manner of construction than anything I can say in the short time I must of necessity give to this branch of our subject. Doing away with the supporting columns of the galleries has done far more than remove the annoyance from the audience of obstructing the view of the stage: it has also tended towards perfecting the fireproof qualities of the structure. Theatres that were built with supporting columns had the tiers and roof, as a rule, entirely constructed of wood. With the cantilevers the tiers are made of concrete or firebrick on steel girders imbedded in concrete, and the roofs are made fireproof. Where a theatre is constructed entirely of fireproof materials, and the audience know it, and there are good exits, the chances of panic are small. The knowledge that the building is fireproof will do as much to reduce panic as good exits—in fact, even more, as it will destroy the nervousness which generates a stampede. There has been a recent improvement in the auditorium, first introduced, I believe, by Mr. Emden in Terry's Theatre, whereby every row of the tiers have direct access to the side corridors by a doorway. By this means much inconvenience is overcome in gaining the seats, and the exit from the circles is greatly facilitated. Theatres of the past were, as a rule, dark holes into which daylight never entered; the consequence was they became dirty, dusty, and unhealthy, besides being much more dangerous than a building which is flooded with daylight. The cleaners in a theatre are, like most human beings, liable to scamp their work and leave little heaps of dust and rubbish in out-of-the-way corners. The recent disaster at Gateshead to a certain extent teaches us that there is danger in the accumulation of dirt in a theatre, for we hear by some of the accounts that a lighted match fell on some paper and sawdust, which produced the smoke that filled the gallery, and caused the stampede. In Austria there is a special regulation enforced, insisting upon the daily removal of all rubbish and trade refuse, and advocating cleanliness in all parts of the house as a special duty. Where an auditorium is provided with daylight, the use and cost of artificial light during the day-time is saved, cleaners and careless attendants have not to go about their work with lamps or candles, and there is no excuse for striking matches in the building. Another and still more important demand for windows, quite apart from their use for ventilation, is the means of escape they provide in case of fire, especially where they lead to outside balconies. Hundreds of lives could have been saved if windows, external balconies, and escape ladders had been provided not only in theatres, but in all buildings where large numbers congregate. I, for one, shall be glad to see the day when external balconies and staircases are adopted in this class of buildings, as seen in the drawings of Mr. Jan Springer's Municipal Theatre, Amsterdam, which he has specially sent for our use. Iron bars before windows should never be allowed, as they prevent the firemen entering a building by the windows, or the occupants to use the fire-escape. It was not my intention to enter into the smaller details of the arrangements of the auditorium, or to speak of sight lines, the curves of balcony fronts, or the seating of the house; but I must refer for one moment to the gangways. Much diversity of opinion appears to exist as to the number of the seats that should be placed between intersecting gangways. Managers complain that certain portions of the audience will stand in the centre gangways and create a disturbance. On the other hand, long rows of seats without intersecting gangways, make it difficult for the people to get out, especially where the seats have backs. I expected to have had a model here to-night of an automatic seat, a German patent, the back of which falls, and the seat rises when the occupant gets up, thus leaving gangways at right-angles to the curtain line, as well as parallel to it. In the rules enforced in Continental cities, the question of intermediate gangways is rigidly dealt with. For instance, in Austria gangways must divide every six seats, and be in a line with an exit door; in Brussels there must be at least two lateral gangways to the rows of seats, and a central gangway may be required. In St. Petersburg not more than twelve seats may be in a row between the gangways, and the middle passage must not be less than 4 ft. 8 in. wide; but in Paris the authorities appear to be satisfied with two side gangways, each 3 ft. 3½ in. wide, or in lieu thereof with a single centre gangway 4 ft. 3 in. wide. I cannot now enter into the questions of acoustics, ventilation, heating, lighting, or fire protection of the auditorium. I therefore propose to pass rapidly over a few details with regard to the improvements behind the curtain.

Stage.—I think we all know that modern theatre-construction demands the division of the stage from the auditorium by a brick proscenium wall passing up through the roof above the stage, and down below and across the underside of the stage to divide the orchestra from the mezzanine. This, of course, leaves the large or proscenium opening unprotected. Common-sense at once tells us that a proscenium wall without a proscenium fire or smoke resisting curtain is but a half-measure for retarding the spread of smoke or fire from stage to auditorium. I am fortunate to-night in being able to ask my friend, Mr. Max Clarke, to speak to us on this subject; as you know, he has made a special study of this very important detail of theatre-construction, and it would be presumption on my part to dwell further on the point, when I hope we shall have his views laid before us at the conclusion of this paper. From the various sectional drawings and models of the theatres it will be seen that there are two floors below the level of the stage; the mezzanine floor, on which is placed all the machinery for working the traps and sliders below the stage, and the cellar or well into which the scenes and sets are lowered. Above the stage are galleries on either side known as the "flies," from whence the ropes governing the cloths and scenes are manipulated, and over the whole of the stage in the roof, or at level of the wall-plate, is the gridiron, an open or skeleton flooring, so-called on account of its likeness to that domestic utensil. From the gridiron hang all the cloths, sky-borders, gas-borders, &c. Over the gridiron, modern requirements demand a large exhaust ventilator to carry off the fumes of the many gaslights on the stage, and the smoke in case of fire. The next point we have to consider, after the division of the auditorium and stage, is the size of the stage. Everything is governed by the size of the proscenium opening; 30 ft. is about the average width of the proscenium opening in the medium-sized theatres, so I will take that width as an illustration. Supposing the opening to be 30 ft. square, the width of the stage from side wall to side wall should be at least 60 ft., or twice the width of the proscenium opening, to allow the removal of the scenes to right and left; passage-way is necessary in addition to this. The height from stage-floor to gridiron should be 60 ft., or twice the height of the opening, to allow the scenes to be lifted up to the gridiron without rolling or folding. Where this can be done the scenery lasts much longer, and money is therefore saved in wear and tear of material; there is also less danger of gas battens coming in contact with the canvas. I do not propose dwelling upon the much-debated question of turning the stage into a furnace or tall chimney by carrying up the walls to a great height above the auditorium, and placing huge ventilators in the roof, or making the stage-roof entirely of wood, that it may burn away and create a tall shaft. There are doubtless some present who will give us their views on this matter. All I have to say is that ample ventilation, both inlet and outlet, should be given to the stage, and, unless there are inlets at a low level, the outlets in the roof will make a down-draught. With regard to the dressing-rooms, the plans of the Garrick and the new theatre in St. Martin's-lane show an excellent arrangement, whereby the dressing-rooms are erected in a separate block or building connected with the theatre by one opening only, and with a separate exit into the open air from such block. By this means the whole of the fire-

risk in the dressing-rooms is taken away from the theatre. As so much of the scene-painters' and carpenters' work which used to be done in the theatre is now done by the scene-painter in his own painting-room, and by the carpenter in his own workshops away from the theatre, it has been found unnecessary to provide rooms for these purposes in our modern play-houses on such a scale as was necessary in the past, and the risks arising from the various trades have been removed. Many of the larger theatres still have their workshops in use, but the day has gone by when the space over the auditorium ceiling, commonly called the "dome," was used for a carpenter's shop or a store for any old lumber and scenery. This space in old theatres was divided from the audience by only a canvas ceiling and wooden floor, with the sunlight flue passing through the midst of the shavings and inflammable material. Where workshops are needed they should be built, like the dressing-rooms at the Garrick, in a separate block of buildings. Another improvement in theatrical matters is that nowadays a large stock of scenery is never kept on the premises. In the West-end theatres pieces are played which are intended for, even if they do not have, long runs. In the outlying theatres travelling companies fill the bill, and bring with them their own scenery. The consequence is that large scene-docks and stores are not wanted. The valuable space can be used by the architect to better advantage, and the manager avails himself of an outside store. So the risk of large stores, like the risk of workshops, is taken away from the theatre. Scene-docks on the stage level are, of course, needed to shift the scenery into, which is in nightly use. You will see many examples on the plans. The introduction of electric light into theatres has induced managers in many houses to provide the wherewithal to generate their own light. Engine-rooms, boiler-houses, and heating-furnaces should be placed away from the theatre, or divided from it by brick walls and fireproof floors and ceilings. In no case should an opening from the engine-room be permitted into any part of the theatre; access should be either directly from the street or from an open area. There is one part of the play-house which does not seem to have gone ahead like the rest of the building. I refer to the stage machinery. The model upon which the stage of to-day is built is the same as used years ago. This, I believe, is the case in America as well as here. No one has appeared to think it worth while to seriously study the requirements of stage machinery, and endeavour to improve the present state of things. It is looked upon purely as a stage carpenter's job, and when a theatre is built, it is left for the stage carpenter to put in his stage to please himself. When the Royal English Opera House was first started, I remember hearing of the great improvements that were to be made in stage machinery, and that nearly everything but the boards of the stage was to be in iron. True, there are some minor improvements in the details, but the broad principles on which this stage is built is the same as used generations ago. There is certainly an opening for the architect to use his power of design towards the perfection of the stage. Mr. Emden, in a paper read before the Society of Arts in 1888, described at great length the stage of the Buda-Pesth Opera House, where the stage floor could be raised in sections, or as a whole by hydraulic pressure. I believe hydraulic power is used in some of our theatres to raise the larger traps called the "bridges," but the "sliders" are still taken off in the old-fashioned way. I cannot enter into the details of stage lighting, or the advantages gained by the use of the electric light; this, like many other points I have not touched upon, I think comes beyond the scope of my paper; but, before concluding, I wish very briefly to draw the attention of the members of the Association to the great improvement in the materials now used in the construction. We have already noticed how the cantilever system brought about the use of the concrete tiers in lieu of the wooden balconies. In the new theatre in St. Martin's-lane these tiers are constructed of patent metallic stone, 2½ in. to 3 in. thick, composed of granite chips, iron slag, and Portland cement. Fawcett's fireproof floor was used in some recent alterations at the Lyceum. The roofs, ceilings, and staircases are now constructed of concrete, in place of wood and stone, and where ironwork is used it is always protected. In providing fireproof construction, so necessary for the safety of the public, one may depend upon materials which, either by nature or the aid of man, have passed through the ordeal of fire, being safe units of fireproof construction. To-day, in place of the theatre on a bad site, constructed of wood, with match-boarded partitions, no proscenium wall, exits, and staircases out of proportion to the number who had to use them, ill-lit, ill-ventilated, with no regard to sanitation, and everything that was most unsatisfactory, we have rising in London playhouses on good sites, built entirely with fireproof materials, with good exits and staircases, and every precaution taken to prevent fire and panic. Nothing I can say to you will illustrate this more, or make a greater impression upon you, than these drawings, and I am deeply indebted to the gentlemen who have so willingly lent me the many plans I have been able to bring here to-night. They tell their own tale, and I wish to take this opportunity of thanking Mr. Phipps, who has specially prepared these plans for our use, Mr. Emden, Mr. Chadwick, Mr. Jan Springer, Messrs. Perry & Reed, Mr. Verity, Messrs. Crewe & Sprague, Mr. Max Clarke, Mr. Holloway, and the manager of the Horseley Company, for the valuable aid they have rendered me in endeavouring to explain to you some recent developments in theatre planning. Many thanks are also due to Mr. Baker and Messrs. Kaye for the models of automatic panic-bolts, and Mr. Nolting for the automatic theatre-seat.

[For want of space we defer our report of the discussion until next week].

THE LONDON COUNTY COUNCIL.

The second meeting of the newly-elected County Council was held on Tuesday afternoon last, the Chairman, Lord Rosebery, presiding.

Tenders.—Tenders were received for alterations at the Cane Hill Asylum. The list will be found under the heading "Tenders."

Proposed Reorganisation of Internal Administrative Work.—The Chairman made a speech of some length as to the internal conduct of the work of the Council, which, as it has been fully reported in the daily papers, we need not give here; and he moved

"That it be referred to a special committee of twenty-four members, with the Chairman, Vice-Chairman, and Deputy-Chairman as *ex-officio* members, to examine into the present organisation of the Council's business, and the method of conducting it, and to report whether any and, if so, what changes are expedient and practicable."

Mr. J. W. Benn seconded the motion, which was unanimously agreed to.

The Committee was then constituted as follows:—Messrs. Arnold, Beachcroft, Benn, Burns, Boulnois, M.P., Clarke, and Fardell, Sir Thomas Farrer, Mr. C. Harrison, Lord Hobhouse, Captain James, Sir John Lubbock, M.P., Mr. Martineau, Lord Carrington, Lord Monkswell, the Duke of Norfolk, Messrs. Pickersgill, M.P., Russell, Saunders, Æneas Smith, Strong, Spicer, Stuart, M P., and Howell Williams.

The Council then proceeded to elect its standing committees.

The Building Act Committee is constituted as follows:—Messrs. Fletcher, Ford, Harvey, Holmes, Longstaff, Marsland, Ranyard, Roberts, Stevens, Strong, H. R. Taylor, and Yates.

The "Betterment" Proposal Again.—The Parliamentary Committee reported, as to the General Powers Bill of the Council, now before Parliament, that the second reading of the Bill had been postponed by the House of Commons in order to afford the new Council an opportunity of considering its provisions. Mr. Baumann had given notice of his intention to move the omission of clause 7, relating to the improvement rate proposed by the Bill to be levied for the purposes of the Cromwell-road Bridge improvement. The Committee thought it advisable that the new Council should definitely state its opinion upon the provisions of the Bill, more especially with regard to the question raised by Mr. Baumann's opposition, and they therefore recommended that the approval of the Bill by the Council on December 10 last be confirmed.

Mr. Charles Harrison said that the proposed improvement involved the principle of betterment, and that it would greatly strengthen the hands of the Committee in promoting the Bill if they were able to state that the new Council had endorsed the policy of the old Council on that question. He, therefore, asked that a division might be taken, so that there might be a record of the opinion of the Council.

The result of the division was that the recommendation of the Committee was approved by 82 votes to 7.

After transacting some other business, the Council adjourned.

THE ARCHITECTURAL ASSOCIATION SPRING VISITS:

THE TOWER BRIDGE.

THE fourth visit of the session, on the afternoon of Saturday, March 19, was attended by a large number of members of the Association, Mr. J. Wolfe Barry, the engineer, having courteously granted permission for the inspection of the works of the Tower Bridge. The party was met by Mr. Crutwell, the resident engineer, who gave an interesting description of the works. Considerable progress has been made since the Association last visited the bridge. The centre towers have been carried up to the full height, as far as the steelwork is concerned, and the cantilevers, which are being built out from each tower, without scaffolding, have made considerable way across the centre-span. These cantilevers will become two bridges for foot passengers when the centre-span of the lower bridge is open for the passage of vessels. Portions of the balance girders for the centre-span, and the steel cables which will connect the upper and lower towers, were to be seen, though in an incomplete state at present. There is as yet little to be seen of the architectural casing which will conceal the elaborate steelwork of the frames of the towers, though some portion of this casing appears in the gateway on the north shore. Messrs. Arrol & Co. are the contractors for the steelwork, and Messrs. Perry & Co. for the builders' work.

THE LABOUR COMMISSION.

FURTHER BUILDING TRADE EVIDENCE.

DURING the last sittings of that section of the Royal Commission on Labour, over which Mr. Mundella, M.P., presides, further evidence* was taken with respect to building trades.

Mr. D. B. MacGregor, Secretary of the Glasgow Master Masons' Association, which embraces forty-three firms, employing 3,000 men, explained that in 1884 a joint committee of masters and men was appointed, which met once a year to discuss matters relating to work and wages. At that annual meeting the hours and the wages were settled for the year, and the system had worked very well. If any master or workman violated the regulations then laid down, he would be brought before a standing committee, by whom the matter was arranged. They had not, however, been able to apply that method to masons' labourers, because the Masons' Labourers' Union comprised all the labourers in Glasgow, whether they served the masons or were engaged in other industries. Mr. MacGregor further stated that the standard wages were 8d. an hour for operative masons and 5½d. an hour for masons' labourers. The ordinary working hours were 51 a week—that was nine hours a day for five days, and six on Saturday. During the five days the men worked from six a.m. to nine; from ten to one, and from six to nine p.m. The employers insured with the Accident Insurance Company for all their men, and this was found to be also a very good plan. He also explained that the Association did not at all object to operatives being members of the trades union, and, as a matter of fact, the masters would be very glad if all the operative masons and the masons' labourers were members of the Union. Finally, he said he was in favour of boards of conciliation and arbitration for the settlement of trade disputes.

Mr. F. Moore, a London carpenter, speaking on behalf only of himself, complained very strongly of the system of overtime, which he described as one of the deadly evils of the building trade, mentioning that he had known men to be kept at work from six in the morning to nine and ten, and even twelve, at night, when they returned home completely exhausted. This evil had existed in the building trade in London generally until recently, when trade had become less brisk, and there was consequently less overtime. The men were, no doubt, paid for overtime, but he felt that the system ought to be abolished, because it was detrimental to the welfare of the men. Mr. Moore also complained of the sweating and driving which prevailed in the building trade, employers sometimes engaging a foreman, not because of his superior knowledge of his trade, but solely because of his capacity for driving and bullying, and getting the utmost

* For previous report of Building Trades evidence see *Builder* for March 5, p. 184.

amount of work out of the men, irrespective of the quality. The result of this was that work was scamped, especially in the busy season. Further, the witness complained of the insanitary condition of many of the shops, and the total absence of proper inspection. Then again, he considered the position of skilled workmen very unsatisfactory. For instance, the cleverest man was on exactly the same level as to pay as the most inefficient man in the shop; there was a dead level of mediocrity, because the sharp workman was not encouraged to make the most of his abilities. He admitted that to a certain extent the action of the trades unions had tended to improve the position of the men and to ameliorate the conditions under which they worked, but still there were isolated shops where these abuses existed unchecked. He also admitted that, although he was himself a non-unionist, the evils he had described would have now been more prevalent, and that the workmen's position was far better in these days than it was, owing to the better education which youths entering the trade had received at the elementary schools. The introduction of machinery, too, had done good by relieving the men of much of the heaviest and most laborious work. Citing other evils existing in the building trades, Mr. Moore stated that it was notorious that at one time foremen often received bribes from workmen to keep them on, but that was now a matter of rare occurrence, owing to exposures. To some extent, no doubt, the association of the men was a protection against that practice, but the inferior shops, where it might still exist, were largely isolated. But for the trades unions these evils would have run riot. But there were certain evils in the unions. One was the equality of wages to which he had previously referred. He considered that the men in London were in a better position than men in the country, for they had a wider field of observation and work, and thus had a better chance of getting on. Speaking generally, the workmen now were well educated, and there was a great desire for improvement. The higher they rose the higher became their standard of living, and general refinement increased. In many cases architects' and surveyors' sons entered the trade, and served time both in the shops and in the office, in order to acquire a perfect mastery of the trade. The rising young men, having received technical instruction, were better fitted for constructive work than their predecessors were; while the introduction of machinery tended to make the men more intelligent and serviceable. This, no doubt, cheapened production, but it was better for the men in the end. Reverting to the trades unions, Mr. Moore, while allowing for all the good they had done, advanced as a strong ground of objection to them the fact that the meetings of branches were so often held in public-houses. He was not a sworn teetotaller, but an abstemious man, and he knew that a great many men who were staunch unionists strongly objected to this system, as opposed to the moral welfare of the men, and he urged that the public-house as a place of meeting ought to be done away with. He next advised that more encouragement should be given to individual merit among the men, and that there should be a better understanding between employers and employed, for, with the master on a pinnacle at one end and the men at the other end, there could be no common ground of good relations. He was anxious to see some system of settlement of difficulties in London such as that described by Mr. MacGregor, and in reply to the inquiry whether with arbitration and conciliation the men must be in a union, and bound by the decision, he replied that in the last strike in London a number of men who were not unionists had a great deal to do with the settlement, many non-unionists being put forward to speak upon the question. As to the reasons which prevented many men from joining the union, he thought the necessity of continually giving a shilling a week for problematical benefits was a strong deterrent. The men did not derive benefit corresponding with the subscription, and they did not care to keep up such a subscription. It seemed to him that the time had come for us to readjust our views as to the status of skilled workmen. He objected to a common term of description being applied to skilled workmen; and he urged that the general status of the men ought to be still further improved in the future. He allowed that the workman was socially more respected and honoured for any virtues he possessed than he formerly was, but even that was not so much the case in England as in America. He believed that the men of the best ability and education did not come to the front in the trade union agitations, but remained quiescent in the background. The agitation was left largely to the official representatives. The superior class of men were steadily increasing, especially among the younger men, who benefited by the easy access to free libraries, by cheap literature, and by the facilities for attending social meetings and educational classes. With respect to hours, Mr. Moore did not advise legislative regulation, because many difficulties might arise, but he would have legislative action to prevent overtime, to which employers so readily resorted. This might be done by the insertion of clauses in the Metropolitan Building Acts, prohibiting work being carried on beyond a certain hour by the same body of men. If the work was really necessary, day and night shifts could be provided. This might be accomplished by the trades unions demanding and obtaining regulations, each trade accommodating itself to the circumstances of the case, if they could; but in the recent strike the masters had been able to coerce the men. The best mode of settling disputes would be a standing board, with a referee, but the referee must be a practical man, and not the architect, whose whole interests were bound up with those of the employer.

Replying to questions from the general members of the Commission present, Mr. Moore complained that there was too much equality of pay, and he objected to piece-work, although in America it acted well. He would discriminate between the different abilities of the men, and have a varying scale of wages. He would not, however, say a joiner, for example, should be called second class or third class, but would use his own discretion and see that his foreman carried that out, in order to encourage the best workmen. If the foreman was incapable of discriminating as to the qualities of the men he would not be capable of carrying on the work. Every man should have a minimum pay, and increased pay according to abilities. The inferior workman was the loudest, and the first to complain; the slower and more inferior his work the louder was his grievance. Witness had not paid attention to a discussion in the engineering trade as to introducing a gradual classification, but no doubt in general terms the question was much the same as he had raised.

Professor Marshall: Do you think it would be worth while to have for each district various minimum rates for class A, B, and C, and so on?

Mr. Moore replied that that might be possible, but if it led to hard and fast lines it would not work. Such arrangements must be simple to be effective,—there must not be too much hard and fast classification. There should be direct dealings between the masters and the men, with a view to sympathetic action. In the next place, Mr. Moore condemned the preset system of giving contracts for public works. The acceptance of the lowest tender was a serious evil, for the contractor had then to rely upon sweating and driving and inferior material. The Law Courts were carried out under the lowest, or nearly the lowest, tender, and the result was bankruptcy of the builder and very inferior workmanship. He knew of buildings which within two or three years had to be shored up, and those had been erected on the lowest tender, driving, and sweating system. The reasonable method would be to receive a good number of tenders and to select the middle tender. The witness finally advocated the establishment of trade halls as valuable and useful, and the provision of technical libraries.

Mr. George Sunley, Secretary of the National Amalgamated Society of House and Ship Painters, having described the constitution, membership, and financial arrangements of that body, explained that they had a system which they called "working rules," which were mutually agreed upon by masters and men, and signed by both. They had also arrangements for providing an arbitrator to decide disputes, and, although they had had several small strikes since 1887, they had generally been settled by arbitration. There was a strike at Hartlepool. It was not about wages, but with respect to the legality of a notice by the men. The employers locked the men out for a fortnight, and the matter was settled by arbitration, the decision being that the notice of the men was illegal. His experience led him to the belief that unionist men were superior as workmen to non-unionists. In many cases the branches of his Society met in public-houses, and he did not agree with the last witness on this point. He had often heard the meeting at public-houses given as an excuse for not joining, but it was not a reasonable excuse. He did not say that public-houses were the best meeting places, but many of the branches were respectably conducted in public-houses, and no drink was allowed in the room while the business was proceeding. The Branch paid for the use of the room. In Chester their meetings were held in the Court House, and in Huddersfield in the Trade Hall; and he was very much in favour of that system as to meetings. Being invited to make suggestions, the witness urged an amendment of the Employers' Liability Act, so that employers should not be able to shift the responsibility for accidents on to the shoulders of insurance companies. To illustrate this, he mentioned the case of a man who recently sustained a serious accident through insufficient scaffolding, and he had to have one leg amputated. The man had taken action in the County-court, and the employer, on receiving notice of claim, simply sent it on to the insurance society. That was not likely to lead the employer to improve his scaffolding, and he had heard of several complaints by men in the same employment respecting insufficient scaffolding. He was not prepared to say that in consequence the insurance society would require the employer to erect safe scaffolding, or would charge a higher premium; but he knew of many employers in Manchester who were in insurance societies, and he had never seen an insurance inspector examining the scaffolding. At the same time, he admitted that there had been in some directions more care and better material employed in scaffolding. It might be difficult for some of the small and comparatively poor employers to provide compensation if they were not allowed to insure, but as a rule the larger employers were the more negligent as to the safety of their men, owing to the system of insurance.

Mr. W. Phillips, speaking as a representative of the London and Counties House-Painters' Society, informed the Committee that his trade had established a rate of wages, and this had been done through the agency of this Society and men who were not organised. In 1872 an agreement was entered into between the masters and the men with the result that the rate of wages was 8½d. an hour. Less was, however, paid in some cases, which was due to the action of employers in employing inferior workmen, putting in scamped work, and refusing to concede the full rate. The recognised rate was paid by the most respectable of the masters; if any paid less, then that was a matter for the union to deal with. The subscription was 2d. a week, but that included nothing beyond the membership of the union. The normal working hours were 52½ per week. Considerable overtime was in operation, which was a matter of serious grievance, especially with respect to night shifts. That work ought to be paid for according to the schedule of the agreement of 1872, but it was not, and he thought the masters ought to be made to observe that agreement. Scamped work, and the employment of unskilled labour, were causing serious injury to the trade, and he suggested that employers should be required to employ only skilled labour and skilled supervision of the work. That, perhaps, was one of the objects of his Society, but at the same time he thought the Legislature should exercise some control and supervision in the matter. In the same way, he believed that if the Legislature adopted some means by which the qualifications of workmen were inquired into, that would remedy a great many of the existing evils. Being asked how this was to be accomplished, Mr. Phillips replied that opportunity might be given to the public in regard to work done, to call in a properly-qualified inspector to see that the work was properly carried out. That would be better for workers and the trade and the community generally. In fact, it should be open to the people interested to have the work examined just as they could have a pound of butter analysed, and he suggested the appointment of some skilled person in every town and district for this purpose. With a view to disputes, he also suggested the appointment of a committee consisting of an equal number of representatives of masters and men, to whom any issue should be submitted prior to a strike taking place. He believed that would effectively do away with strikes. The committee would take care that no strike or lock-out took place without serious grounds and close investigation. In his trade, witness further stated, there was a small amount of co-operation, and there had been some attempt at profit-sharing, but the experiments, so far, had been too limited for him to deal with the question at present. Turning to other points, Mr. Phillips urged the amendment of the law as to the relations between employers and men. For instance, it ought to be made a penal offence for an employer to apply any power against a workman for joining a trades union; any man should be at liberty to do so, and any attempt to black-list or boycott him should be a penal offence. That being so, he would accept the converse, viz., that the boycotting of non-union men by unionists should also be made illegal. With respect to the regulation of hours, he considered that legislative restriction was the most effective method. He would have the Legislature fix a maximum rate as to hours, and make it punishable to employ men beyond that period. A statute should be passed enforcing a maximum of eight hours a day, but with permission to work beyond on sufficient evidence of necessity being shown,—provided also that men who were idle should be taken on, and that under no circumstances should extra hours be imposed on those already employed, unless there were no idlers. This should be decided by a joint committee of masters and men. Many serious difficulties which now arose with reference to season work could in that way be removed. A great deal of the work could be done in the winter which was now done in the summer, and he advised that Government work and municipal work should be held over in order that men should be able to fill up time at a later period, believing that the community would prefer to see a useful worker properly employed than to have to support a pauper and his family. Public work, in short, should be done either in the winter or during the slack season. In many cases external work could be as well done in the winter as in the summer, and in some cases internal work could be better done in the winter; and in the winter there was not so much temptation to the men to "play" at the work. Local authorities should do all they could to employ men when they were not generally engaged in private houses. Making a black-list was the refusal of an employer to employ a man because he belonged to a trades union and took part in a strike, not only during the strike, but even afterwards, so that a man might starve. He did not know of any specific cases during the last nine years; but the practice might crop up again, and unless there were some

means of dealing with them the evils would increase.

Mr. J. Anderton, President of the Operative Plumbers' Association of Great Britain and Ireland, stated that up to the end of 1891 the Association had 5,500 members, and there had been some subsequent increase. There was another Plumbers' Association in Scotland, but it was an open institution only, and his Association had a number of lodges in Scotland. The subscription had advanced in time from 6d. a week to 8d., and now it was 9d. Having explained the system of relief and benefits, the witness said the trade had had eleven disputes between 1889 and the end of 1891, but they had arbitration rules whereby a board of conciliation and arbitrators were appointed by employers and employed, and all these disputes,—in Birmingham, Newcastle, Liverpool, and elsewhere,—had been settled in that manner. Since 1865 they had spent 13,180*l.* on trade strikes and disputes, but during the last two years only 132*l.*, for they found they could arrive at the same results without strikes. They had, indeed, spent a great deal more in sick-relief and other benefits than on all the strikes and disputes; and he admitted that they would now be very glad to have in hand all they had spent on strikes. In this trade there was very little friction between masters and men, for the fact was that most of the masters had been workers themselves. They knew the workmen's ways and weak points, and stubbornness, and the workmen knew their ways, and thus there was mutual respect and sympathy. They did not want the Legislature to settle disputes and hours and wages, preferring to do all that themselves, but they were very much in favour of boards of conciliation all over the country,—voluntary boards. They also desired voluntary registration, and not registration enforced by the Legislature. The registration measure now before Parliament aimed at elevating the men, doing away with slop work and jerry work; and it was to the interest of the public that every plumber should be registered. He further advocated an examination and test, and suggested the appointment of a registration committee when a new district was opened.

Mr. Albert Emmett, Secretary of the Operative Bricklayers' Society, Ashton-under-Lyne and District, explained that his union, which numbered some 300 members, decided for itself all questions respecting pay, hours, and so on; and, although the men might strike if they chose, they would do so at their own risk, and would receive no strike pay. The weekly subscription was 6d. For this the men received no sick pay, but if they met with an accident they received 12s. a week for three months, and 9s. a week for a further three months. In the event of total disablement an allowance gradually falling to 5s. a week was made. He was in favour of the establishment of a standing committee of masters and workmen for settling all disputes and avoiding strikes, but no attempt has as yet been made in that direction; but he was not in favour of legislative regulation of hours.

Mr. J. Stirk, Secretary of the Leeds and District Operative Stonemasons' Society, stated that although that Society only numbered about 400 members, and there were about the same number of non-union masons, there were in the district something like 3,000 men altogether concerned in the building trade. The Society had no means of settling disputes, and, therefore, if any difficulty arose they must fight it out with the masters as best they could. But as six months' notice had to be given on either side, they thought that allowed sufficient time for arriving at a conclusion, and for making up their minds. They did, however, settle the wages and hours themselves, subject to the consent of the executive. There was no feeling in the trade against settlement by arbitration, and the feeling between the employers and the men was very good. Mentioning that at the present time there was a notice out which was given last October for a rise of wages, which notice would expire in May next, the witness said the present rate of wages was lower than it was ten years ago. During thirty-six weeks they worked fifty hours a week, and during the remaining sixteen weeks, forty-three hours. They were paid overtime, and double for work on Sundays, Good Friday, and Christmas Day; but their work was very irregular, and they suffered a good deal from that. He thought they would get on better if all the masters were associated as well as the men, and when they had any difficulty with a non-associated employer, they tried to induce him to become associated. They got on "first-class" with the employers; but they objected to work with non-unionist men when he unionists were in a majority, otherwise they worked all together. They did not directly refuse to work with non-unionists; but if the latter were in a minority they had to join the union, or the unionists would leave. They did, in fact, boycott the non-unionists when they could,—the latter could not boycott them,—and they had a black-list on which they placed a man for six years, unless he joined the union before that time elapsed. He admitted that it would be fair for the non-unionists to "black-list" the unionists, if they chose; and, as the union had got fully half of the men in the trade with them, he thought they had done very well. The trade had no piecework, for they objected to it; and there was no sub-contracting. He thought the Employers' Liability Act operated fairly, but no case had yet arisen in his district. And, in fact, since the Act was passed there had been a great improvement in regard to scaffolding and other matters, which he attributed to the enactment of that measure.

Mr. H. Hamm, Secretary of the London branch of the Alliance Cabinet Makers' Association, next gave the Commission some striking information respecting his trade. In the whole country, he said, there would be about 70,000 or 80,000 cabinet makers; of these London had from 20,000 to 25,000, and his Association had 6,500 members. He calculated that only about 15 per cent. of the total were union men, and this he attributed to apathy. In fact, he rather thought the trade was deteriorating, partly because the older firms mostly bought their furniture, instead of making it as they formerly did, and partly because the men were not allowed sufficient time, and had to hurry over their work. A further reason was that the trade was now very much split up into departments, so that men had less chance of becoming good all-round workers. Some men worked by the day, some on piecework, and some on the "lump." On the "lump" work the employer paid so much for the whole article; on the piece system, so much for each portion of the article. In the provinces the rate for piecework was from 7d. to 8½d. an hour; in London it was 9d., but some men took less. The hours in London were fifty-four a week, but the sanitary condition of the workshops was in some cases very bad. To illustrate his views as to the decline of the cabinet-making trade, Mr. Hamm said not only was furniture frequently displayed and described as "our own manufacture" when it was not so, but had been bought in, but very often a piece of furniture marked "solid brown oak" was likely enough only white oak, browned or veneered. It was the same with regard to articles marked "solid walnut,"—it would be white oak overlaid. It was supposed that there was a law to deal with such deception, and they meant at some future time to test that point. The Merchandise Marks Act might make such a trick punishable, but 99 out of 100 purchasers would not detect the fraud. Another trick was for a master, on being offered a new design by a workman, to detain it on the pretext of considering the offer, to get an imitation of it made up, and then to return the original, as not wanted, to the designer. A further evil was that apprentices were taken in and allowed to play about in the shops without being properly instructed, and the result was that very few ever became highly skilful workers. Mr. Hamm further stated that his Association managed to maintain, and to some extent to improve, the rate of wages without resorting to strikes, and he expressed himself favourable to the establishment of an eight hours' day.

Mr. Whitley, Secretary of the Leeds Branch of the Alliance Association, described the prejudicial effect of the employment of Jews, who worked at a low rate for long hours, and turned out inferior articles; he denounced the system of inspection as inadequate, and stated that there was a diversity of opinion in his district as to the eight hours' question.

The remainder of the evidence taken by this section related to coach-building, coopering, chemical, and copper works.

The Commission have decided to present to Parliament an *interim* report, comprising the evidence taken up to Christmas, and to adjourn all the sections from the close of this week to May 3.

Illustrations.

SCULPTURE: "JEANNE D'ARC."

THIS group, entitled "Jeanne d'Arc entend ses voix," represents Joan of Arc in the act of listening to the "voices" which inspired her to arise and save her country. The figures above represent St. Michael, St. Catherine, and St. Marguerite.

The group, which is by M. André Allar, was commissioned for the new church in course of erection at Domrémy to the memory of Joan of Arc, and is to be placed over the porch. The group formed a conspicuous object among the sculpture exhibits at the Salon of 1891. The figures are of life-size.

"TOKEN HOUSE," COPTHALL-AVENUE.

THIS building is situated in what was formerly known as Little Bell-alley, but which has now been improved by the Commissioners of Sewers into Copthall-avenue, and has been recently erected for Messrs. Fred. C. Mathieson & Sons, printers and financial publishers.

In the façade an attempt has been made to gain a somewhat greater effect of repose and solidity than is sometimes found in elevations, which are required, as in this instance, to comprise the greatest aggregate area of openings allowed by law. The horizontal divisions between the ground and first and the second and third floors respectively have with this view been almost obliterated, so as to leave greater masses of wall-space available for the pavilions at either end of the building.

The materials of which the front is built are Cornish granite from the Colcerrow quarries for the lower portion, the plinth and base being rough and the piers polished, and Portland Whitbed stone for the remainder.

The ground and first-floors have been arranged for letting as offices; the basement being used by Messrs. Mathieson for their heavy machinery, the second and third floors as composing-rooms, and for reference books and papers, and the upper floors for binding and work in connexion therewith. A hydraulic and other lifts connect these floors.

The work has been carried out from the designs and under the superintendence of Mr. T. Barnes-Williams, F.R.I.B.A., and the contractors were Messrs. Higgs & Hill.

BIRMINGHAM GENERAL HOSPITAL.

WE give this week the plans and principal elevations and sections of the designs for this important hospital by Mr. Henman, of Birmingham, which have been selected in the recent competition. We gave such a full description of the general arrangement of the plan in our leading article of the 19th (to which the reader is referred), that it is only necessary here to give a few further details from the architect's report, in regard to some special points.

In regard to the subject of lifts, staircases, and water towers the report says:—

"*Lifts.*—Two in number, worked by hydraulic power,—viz., one suitable as a bed-lift, and a smaller one for stores, &c., are advisedly placed in a service-room holding a central position just off the main corridor.

In most of the hospitals visited I noticed that the lifts open direct from the main corridor; and as an evidence that they have been abused or the cause of accident, printed notices are posted near them giving warning that they are not to be used without the presence of an attendant. In some hospitals two or more lifts are provided in different parts of the buildings. This is proved to be unnecessary, for I found in such cases only one in general use. It must be evident, that such appliances, when constantly used, are more likely to be kept in perfect working order,—available at a moment's notice,—and, requiring the attendance of a person experienced in manipulating same, should be in the most central position. The use of light stretchers on wheels, so greatly facilitating the transference of patients from one part to another on the level, obviates the necessity of distributing lifts throughout the buildings; and when the kitchen is on the top story, the frequent traffic up and down warrants the employment of an attendant being *constantly* in charge of the lifts.

Staircases.—With lift accommodation such as is proposed, the staircases become of secondary importance, but must be well distributed for the use of the staff, and of fireproof construction as a precaution in the event of fire or alarm (more than ever necessary since the recent deplorable catastrophe in America). In many hospitals the staircases appear to have been designed rather with a view to architectural effect than to utility, and being entirely open to the corridors on the several floors, convey the air from the lower to the upper wards. This it is proposed to obviate by screening them off on each story, and separately warming and ventilating them.

Water Towers.—Above the two principal staircases the buildings are carried up as towers, in which large cisterns, for the storage of water, will be placed.

Although Birmingham is fortunate in having a constant water-supply, there are occasions when, for repairs to mains or other causes, the supply is cut off for a time. Even such a temporary stoppage might be attended by serious, and even disastrous, results, in case or fire, unless there were on the premises ample storage capacity at a high level. Hence, what at first sight may appear simply ornamental features added for architectural effect, are in reality, when used as proposed, supplemented by suitable mains and properly-distributed hydrants, of the utmost importance for the well-being and safety of the establishment."

The following remarks may be quoted in reference to the sanitary arrangements, heating, ventilation, &c.:—

"The utmost care has been exercised in planning the several sanitary requirements so that they shall be convenient, inoffensive, simple, and effective.

To all the principal wards they are situate in octagonal turrets at the ends furthest from the main corridors, cut off from the wards by intercepting lobbies provided with cross-ventilation, — intentionally of moderate size,—so that they can only

be used as passage-ways, because where of large dimensions they are often improperly supplied with wash-up sinks, and used for storing articles which would be better further removed from the wards.

The octagonal turrets will not obstruct light and air so much as if they were square on plan.

On one side are two w.c.'s and a wash-up sink; on the other, lavatories and a bath, with crane arrangement above for bathing helpless patients.

The w.c. apparatus throughout will be of the pedestal-hopper form, with trap and funnel-shaped outlet (which prevents syphonage, and does not allow the lodgment of sewer-gas in any part), taken directly through the wall to the soil-pipe and upcast-ventilator (see detail drawing).

An attempt has been made to incorporate these soil and vent pipes in the architectural composition without detriment to their sanitary usefulness; for, although they must necessarily become prominent features, there is no reason why they should appear in all their crude ugliness. The wastes from baths and lavatories are treated in a similar manner . . . .

I propose to rely upon what is popularly known as natural ventilation. Steam-pipes will be employed for the general heating of the wards. Cheerfulness is secured by the open fireplaces at the ends. Along the side walls, between the windows, upcast ventilating flues are provided,—*separate* for each ward,—carried up to the very apex of the roof, the draught being accelerated by means of steam coils, and down-draughts prevented by oiled silk flaps. Fresh air will be admitted by the windows and by special openings direct from the outside, arranged so that in cold weather the incoming air will be warmed by impinging upon the steam-pipes, provision being made for filtering the incoming air through cotton-wool, &c. The ventilating openings and heat can thus be regulated in each room by itself.

To each of the principal wards there will be six up-cast flues, each 18 in. by 18 in., in addition to the flue from fireplace, or a total superficial area of 14½ ft. super, so that if the upward movement in them is at the rate of only one foot per second, the whole air of the ward will be changed every half-hour, whereas it is generally accepted as adequate if provision be made for the air to be renewed once every hour, travelling at the rate of two feet per second in the flues. In certain states of the atmosphere, however, with so limited a flue area, difficulty is in practice experienced to secure a sufficiently rapid change of air in hospital wards. I therefore advise that the vent flues be large and numerous,—for they can readily be reduced in power of extraction, when necessary, by closing valves, but can only be increased hereafter at heavy cost, and probably by the disfigurement of the buildings.

For use in summer weather, means of propelling air into the wards may be advisable. In such case I suggest that it should be applied direct, the motive-power being from the Corporation high-pressure hydraulic mains, the apparatus being attached to each ward to be supplied with air. The advantage of using water as the motive-power is that as its force is spent it may, in the same apparatus, be employed for cleansing the incoming air. . . . .

Cross Venilation to Corridors.—With a view to the isolation of any ward, in case of need, portions of the corridors are of less height than the remainder, entirely open above to encourage circulation of air around the buildings. Generally, doors across the corridors would be objectionable and inconvenient, but, when necessary, temporary screens could easily be provided at these points.

Windows.—As boxings and linings of all kinds are objectionable in a hospital, solid frames will be employed throughout, the lower portions of the windows formed as casements, and the upper portions hung at bottom, all opening inwards. By this means the patients are best protected from draughts when the windows have to be opened, and when necessary to thoroughly air the wards, the whole area of each window will be capable of being opened to its full extent,—a feature of considerable importance, yet very rarely attained. To prevent accidents to patients, light iron guards are provided outside.

The Electric Light is suggested for use at night time, so that the air of the wards may not be vitiated by the fumes from burnt gas. A movable bracket would be provided to each bed, so as to be available for close inspection of the patient."

In regard to the question of cost, the architect considers it preferable to prepare as complete and perfect a building as possible, and state which portion could be erected for the proposed outlay. He estimates that by omitting such portions of the building as are not detailed in the requirements, viz., the two towers (leaving in the staircases, &c.), the conservatory, the Turkish and medicated baths, the porter's lodge, the septic wards as a separate building, a portion of the nurses' home, and reducing the laundry (if the course now adopted be continued of sending the bulk of the washing to be done away), the remainder may be carried out for the sum of 80,000*l.*, and, as funds permit, the design could be completed.

COMPETITIONS.

THE COXLODGE ASYLUM EXTENSIONS.—A meeting of the Visiting Justices was held at Coxlodge Asylum on the 16th inst., under the chairmanship of Alderman W. H. Stephenson. After the ordinary business had been transacted, it was resolved that the recommendation of Mr. Hine, the architectural assessor, with respect to the premiated designs for the extension of the Asylum should be adopted. That recommendation, as mentioned in the *Builder* for February 20, places the plans of Mr. J. W. Dyson 1st, those of Messrs. Carr and Montgomery 2nd, those of Mr. W. L. Newcombe 3rd, and those of Messrs. Knill Freeman and S. R. Robins 4th. Mr. Dyson will consequently be appointed official architect of the extension, and premiums of 150*l.*, 100*l.*, and 50*l.* will be proportioned in the order named to the other successful architects. This decision requires the confirmation of the Newcastle City Council to be carried into effect.

NEW BOARD SCHOOL FOR GOOLE.—A special meeting of the Goole School Board was held on the 18th inst. for the purpose of deciding the best and second best of the fifteen sets of plans sent in to the Board for competition in respect of the new school premises proposed to be erected in Bookferry-road. Premiums of 50*l.* and 20*l.* had been offered for the first and second best designs. The plans of Mr. W. Watson, of Wakefield, were accepted, and that gentleman was appointed Architect to the Board. The second premium was awarded to Mr. A. Williamson, Goole and Bradford.

Correspondence.

To the Editor of THE BUILDER.

MANCHESTER ROYAL INSTITUTION.

SIR,—May I be allowed to express my warm sympathy with you in your remarks as to the contemplated destruction of the beautiful interior of this unique example of happy adaptation of Classical forms and character to modern uses?

From the first time of my acquaintance with it, now nearly half a century ago, I never lost an opportunity when in Manchester of looking into the building, were it only for a possible minute, to enjoy the charming architectural picture you so well describe, and it is really almost inconceivable that a municipality possessed of such a gem of art should be so insensible of its value, or so utterly without sound advice in the treatment of their buildings, as to propose branding their community with vandalism to such a degree. It is hard to express the feelings of astonishment, and, indeed, shame, which such a project inspires, and one would fain hope that a timely protest might yet avail to prevent what would be almost a national disgrace; and in a day when so much is urged as to the need of general instruction in art to enable us to keep our place in the ranks of European civilisation. AN OLD ARCHITECT.

March 22, 1892.

"RESTORATION" AT LINCOLN CATHEDRAL.

SIR,—It now seems but too certain that the Dean and Chapter of Lincoln are preparing to destroy a part of that most majestic and historical building entrusted to their care. The building bears on its face the evidences of its growth through many centuries. It is left to the nineteenth century fully to discover that this is not as it should be. It is left to us to forge, to tell archæological lies, to try and falsify history under the name of restoration.

We are told that the page of architectural history written out for us in this church by Sir Christopher Wren (who, it must be remembered, did not himself pull down, but, finding a void, filled it up in the style current in his time, just as his predecessors had done before him) is out of keeping. Of course, we all knew this, but a genuine work of any style is better than a piece of sham. You have, however, in the *Builder*, so well stated the case against the absurdity of setting up a sham Gothic side to the cloister that on this head no more need be written.

We cannot doubt that Dean Butler and most of his colleagues have visited Salisbury. No doubt they have, as the fashion is, condemned the barbarities of Wyatt. Wyatt pulled down the Hungerford and Beauchamp Chapels, because they were intrusions and not in style with the rest of the cathedral. The Dean and Chapter of Lincoln wish to do the same by their cloisters. Wyatt pulled down the bell tower because it spoiled the view. These gentlemen do the same by their close, removing, amongst others, one mediæval house of great interest; and if it be true that they propose to set up Wren's Library where they have pulled down the houses, such a course seems but the adding of folly to folly. But, Sir, are we quite right in throwing all the blame on the Dean and Chapter of Lincoln? Does not the evil begin in our own profession? If the architect had been more anxious to preserve and honestly repair, rather than to "restore" and build up sham antiques, would our churches be the cold, lifeless, unhistoric edifices most of them have become? It is to be feared that our profession is chiefly answerable for raising the monster of destructive restoration, and it is only as yet amongst a few that the hopeless folly of trying to turn back the wheel of Time is realised. The clergy have learnt the lesson of restoration but too well. When their churches have been "thoroughly restored" they look brand new, and that is what is really liked.

We may excuse the ardour of the budding Gothic revivalist. Nothing, however, can make up for the destruction he has wrought; and still less can be forgiven deliberate falsifications by those who in the fulness of time and ripeness of knowledge go on in the stupid rut in which they first began.

It seems clear that in the present instance Mr. Pearson is responsible for the useless destruction now recommended to the Chapter. This unfortunate cloister has already suffered at his hands. The open walls toward the garth had soon after their erection swung over a little. They had been supported by small intermediate buttresses, examples of the skill with which our forefathers could make even a prop an object not unpleasing to look upon. Mr. Pearson has "restored" the cloister and restored away the intermediate buttress so that this page of history is carefully removed. Then to reveal the outside of the doorway to the Chapter-house which was altered by the builders of the cloister, the cloister itself has been cut about and its eastern walk falsified. To crown the work we are now to have a sham north walk. A good building is to go and a thing which can have no real interest for any intelligent man is to be set up.

Are we told that Wren's building is to be set up somewhere else? Our answer is that it is impossible. Wren's work was often somewhat dull, but he was always careful of his proportions and that the building he designed should suit its place and purpose.

The library, following these rules, stands on an arcade, which forms the north walk of the cloister. When the building is set up elsewhere, what reason will there be for the open cloister below it? The east end of the library, with the stairs, is engaged in the east walk of the cloister, the west end is similarly engaged. Here is a nice opportunity to "complete" Wren's design and add that to his building which he never thought of.

Would any man of cultivation venture to treat a manuscript in the way in which a restoring architect treats an ancient building? Would he tear out a damaged page and trust to put in a new one so that no one should know? or would he daub his fanciful restorations over the old but damaged page?

The worst feature of an architectural restoration is that the old evidence is destroyed in setting up the new work. If the restorer would confine himself to paper it would not matter.

I venture to believe that we ought not so much to blame the cathedral dignitaries, and find them fifty years behind their time, as we should blame their advisers. Who now thinks about the Chapter of Salisbury who followed the advice of Wyatt? It is Wyatt himself who is held up to reprobation. So is Scott blamed for many a so-called "restoration," and not the Chapters under which he worked. So will be Mr. Pearson, as the historic spirit grows and the restorer fades away. Perhaps one niche in this temple of fame may be reserved for Lord Grimthorpe; but, fortunately, his practice is limited, and his attempts at architectural restoration so

clumsy that the youngest tyro would hardly be deceived. SOMERS CLARKE.

Dean's-yard, Westminster Abbey,
March 21, 1892.

CRYPT IN WATERGATE-STREET, CHESTER.

SIR,—Every architect must feel grateful to Mr. T. P. Ivison for his beautiful illustrations of Old Chester which you have so admirably reproduced. The view in Watergate-street which you published in your number of 27th ult. is a masterpiece. Both Mr. Ivison and yourself will, however, be glad of two corrections:—

1. The date of the erection of this crypt is given in your text as about A.D. 1180.* From the sketch, however, it is clear that the work is of the reign of Edward I., 1272-1307. The writer states that it is believed to have been erected by the sixth Earl of Chester of the Norman line, which shows that the date given for Earl Ranulph de Blonville (query Fairton) is correct, as this allows an average of nineteen years to each tenant of the title.

2. Mr. Ivison has introduced an altar. This is right enough, but he has placed the altar against the *south* wall, instead of toward the east. No Catholic altar *can* be placed, *according to the rubrics*, as that the celebrating priest shall face in any other direction than *eastward*, following, of course, the arrangement both of the Jewish Tabernacle and Temple, and of the Pagan temples also, as mentioned by Vitruvius.

I may here state that there exists a very similar crypt,—known as that of the Grey, or Franciscan Friars,—in Middlegate-street, Great Yarmouth. GEORGE GILBERT SCOTT.

London, March 14, 1892.

P.S.—The Jewish Holy of Holies was toward the *west* (cf. Exodus, cap. 26), and the Petrine Basilicas followed this occidentation. The Pauline Basilicas, however, have their sanctuaries toward the east, in this following the Orientation of the Pagan temples. But in all cases the celebrating priest faces eastward (cf. my "Essay on the History of English Church Architecture," cap. 1. and 2).

MISS SELLERS'S LECTURES.

SIR,—I have only just had my attention called to a paragraph in your issue of March 5, criticising portions of my lecture on the development of the Greek temple. I would ask permission to state what I actually did say, as the writer of the paragraph obviously laboured under the disadvantage of having to criticise statements which he had only heard at second-hand. The attack being chiefly directed against my explanation of a passage in Vitruvius (lib. iv., cap. ii. 4), it will be simplest to begin by quoting the passage in full. "Non enim, quemadmodum nonnulli errantes dixerunt fenestrarum imagines esse triglyphos, ita potest esse: *quod in angulis contraque tetrantes columnarum triglyphi constituuntur; quibus in locis omnino non patitur res fenestras fieri. Dissoluuntur enim angulorum in ædificiis iuncturæ, si in his fuerint fenestrarum lumina relicta;* etiamque ubi nunc triglyphi constituuntur, si ibi luminum spatia fuisse indicabuntur, iisdem rationibus denticuli in Tonicis fenestrarum occupauisse loca uidebuntur. Utraque enim, et inter denticulos, et *inter triglyphos, quæ sunt intervalla metopæ nominantur;* ὀπάς enim Græci tignorum cubilia et asserum appellant, uti nostri ea caua columbaria: ita quod inter duas opas est intertignium, id metopa est apud eos nominatum." The first passage I have italicised shows sufficiently that Vitruvius is speaking of buildings where the triglyph occupied precisely the position which the writer in the *Builder* claims for it in Greek buildings, where "it was shifted to the angle of the building," and not left "over the centre of the column, as the Romans did." My words are most unfortunately misstated in the *Builder*. To say that "the triglyphs represented spaces" would be a mere repetition of the nonsense which even Vitruvius had to refute (". . . . . nonnulli errantes dixerunt," &c.); what I did say was that I believed the architrave represented the binding-beam of the old mixed clay-brick and wood construction, and then,—following Vitruvius,—that the triglyph represented the end of the beam that was laid in the *ope, i.e.,* the *cubile*, or "bed," made or left to receive the beam in the strip of wall above the architrave, while the metope (a space between two *opai*) represented the solid piece of wall left standing between the *opai*. I think this may be allowed to be a rational explanation. As to the *metope* representing a space originally left open (the explanation given in any architectural primer), this is by no means proved by the fact that the *metopai* of the Parthenon are thin facing slabs. Because at some given date an architectural member had become merely ornamental, and was, therefore (probably for economy), built as slightly as possible, there is no need to deny its constructive origin. Nor does the pivot metope help the matter. A more striking instance, which I am astonished not to have had quoted against me, is afforded by the well-known passage:—

ὅρα δὲ γ'εἶσω (or γεῖσα?) τριγλύφων ὅποι κενὸν δίμας καθεῖναι.—Eurip. "Iphig. Taur.," 113.

Quite so, but starting with the solid wall,—a portion of it could be removed to make one or more windows, in the same way as portions had been removed for the *ὄπαι*.

Bötticher has been a great authority in his day, but the difficulties he created for himself and his readers from his attempt to preserve the *metope* as the open space between two triglyphs, instead of the closed space between two *ὀπαί* are quite amusing. He tries to show that *ope* and *metope* are the same! ("Tektonik der Hellenen," p. 205). He gets enraged with Vitruvius, calls him "unklar und verworren"; further, does not hesitate to correct him on the passage "quod inter duas *ὀπάς* est intertignium." Not so, he says, "Sondern es hätte heissen sollen *quod inter duos tignos est intertignium.*" And yet Vitruvius had read Silenus on the Doric orders, and Iktinos on the Parthenon! (Lib. vii. Præf). The great Semper thought the whole *triglyphon* merely ornamental in its purpose. It would be pure pedantry to go on quoting. A glance at the list of contradictory opinions collected by Joseph Durm (p. 83 of "Baukunst der Hellenen") affords perhaps sufficient excuse for the bewildered student who deserts these latter-day authorities, and finds that Vitruvius's statements become absolutely luminous when he is read in the light of the *facts* of Greek architecture, without the help of his commentators.

Further, the connexion of Doric architecture with the "quasi-timber rock-cut designs" of Asia-Minor is by no means so well proven as the writer in the *Builder* implies. It is not a point I feel competent to discuss, yet I may quote the following passage from so able an architect as M. Charles Chipiez: "Dans la charpente asiatique on ne rencontre pas de triglyphes—on ne voit pas de mutules; on reconnait simplement le principe des modillons." ("Hist. Critique des Arts et de la Formation des Ordres Grecs," p. 207, seq.) Surely it is in the clay-brick construction, with its binding-beams and stone sub-structure—such as the excavations of Hissarlik, Tiryns, Mycenæ, and, above all, the Heraion at Olympia, have revealed it to us—rather than in the lignite constructions of Asia-Minor, that we must seek for an explanation of Doric forms.

With regard to one other point. I am criticised for starting architectural examination from the *cella* instead of from the *order*, though my critic owns that "in regard to the main architecture of the building, no doubt the cella is the constructive *raison d'être* of the temple." Without entering into the large question of the *generic* incapacities of woman, I can yet honestly state, as an *individual*, that I was fully aware of how unpopular my attempt at arguing from the essential to the ornamental would be with a public trained amid those productions of English architecture where the *raison d'être* is so often left for a possible afterthought. EUGÉNIE SELLERS.

March 19, 1892.

P.S.—May I take this opportunity of answering one other stricture made upon my lectures, and which had escaped my memory till now? In a note to the report of my second afternoon lecture at the British Museum (*Builder*, February 20), when I had interpreted the so-called Selene of the eastern pediment as a figure of Nux, *because she drives*, it is stated that "the head of the 'Selene' horse quite allows of the supposition of a rider." Possibly, so long as we only had one horse to deal with. Bruno Sauer's admirable investigation of the actual Parthenon pediments (See "Athen. Mittheil.," Heft I., 1891) has fortunately settled the whole question, as in addition to the one horse in London, two remain *in situ* on the temple, leaving us to infer a fourth. Short of being a circus-rider, the charming little figure must henceforth be looked upon as a charioteer. In speaking to a class of students I had not thought it necessary to revert to the Sauer discoveries. I had discussed them at great length last term.—E. S.

*** Miss Sellers's clever letter certainly shows that she has given more attention to the subject than we had supposed, but it does not convince us that Vitruvius knew much of the real origin of the triglyph, and it does not alter the fact that, to any architect, the triglyphs are the piers or supporting parts of the upper structure (just as the columns are below), and the spaces between of less constructive importance; hence their peculiar suitability for sculptural treatment. On the subject of the original open-space character of the metopes we may call Miss Sellers's attention to Fergusson's foot-note and sketch in the "History of Architecture," Vol. I., page 248 (second edition), which is much more to the point than the remarks of Vitruvius. Miss Sellers's sarcasm at the close about the productions of English architecture where "the *raison d'être* is left as an afterthought" is neat enough, but has nothing to do with our criticism. What we pointed out was that in regard to architectural design and expression the Greek exterior columnar order is the great fact of Greek architecture. It has influenced the architectural designs of the whole civilised world for two thousand years, which certainly cannot be said of the *cella* of the temple, however important that was at the time.—ED.

STEAM-ROLLING ON MAIN ROADS.

SIR,—I have read with much pleasure your article upon "Steam Road Rolling" in your issue of the 19th inst. My report upon the subject to the Frome Highway Board, to which you so kindly refer, was written mainly for the use of the County Works Committee of the Somerset County Council, and was made the basis of a resolution offering the various contracting Highway Authorities in the county the sum of 10d. per cubic yard for all stone rolled in by the steam-roller, subject to the quality of the stone being approved by the County Surveyor. It is almost impossible to obtain any accurate comparison of the actual cost of steam road rolling in different districts, owing to the variety of opinion as to the particular items which should be included in that cost. In some statements only the wages of the driver and cost of coal, oil, and waste are included; whilst, on the other hand, some surveyors include the cost of the stone. In the report above referred to, I have included all the *extra* items of expense which would not have occurred had the stone been left to consolidate by the traffic, and these items only. They consist of driver's and sweeper's wages; horse hire for hauling water; coal, oil, waste, brushes, &c.

The principal item is the horse hire, and this must depend upon the distance from which the water has to be hauled. I find, however, that by using a water-barrel containing 175 gallons I can generally manage with one horse, making the cost about 2½d. per cubic yard.

The steam-roller and water-carts are the property of the authority, and, in a further report to my board, I have estimated that the depreciation and repairs would be about 1½d. per cubic yard consolidated.

Including these last-mentioned items, I find that I can satisfactorily consolidate Black Rock (Mountain Limestone) at a cost of 9d. per cubic yard.

With regard to "binding," I always use a small quantity (about 5 per cent.) of well-weathered road-scrapings, applied when the materials are nearly consolidated.

I have all stone broken to a 2½ in. gauge.

ALLAN GREENWELL, A.M.I.C.E.,
Surveyor to the Frome Highway Authority.

Surveyor's Office, Frome, March 22, 1892.

SIR,—Kindly allow me to correct a few errors in the article on the above.

Gloucestershire does not contract for manual labour. We employ day labour, except in one district of 54 miles, where the system of letting the labour on stated lengths of road (we found in existence when we took over the roads) is continued.

It does not commend itself to me in any way, and encourages a low form of sweating. My own experience of road contracting is that it does very well for five years, then the roads go to pieces, and you have to spend all your previous savings to put them to rights.

Steam-rolling cannot be defended on economy of cost, but it can as a saving to the user of the road.

Ten years' careful watching their cost in this county show they add 53*l.* per mile to the annual cost, that rolling alone costs 24*l.* per mile.

It saves by consolidation without abrasion or trituration one-eighth of the metal.

There are three distinct operations,—rolling, watering, brushing,—not required for wheel-rolled roads, and I have hitherto failed to find the surveyor that can do this for nothing.

The cost of breaking-up the surface to refuse is also considerable. Notwithstanding this, I am so convinced that they are necessities of civilisation, that I am asking my council to buy four more, making eight in all, and I could find work for thirty on the 1,060 miles of road we maintain.

It must be a thicker coating to make steam-rolling economical, and we find that a cubic yard only covers 8 yards superficial, and not 17 yards as at Frome.

The use of blindage requires great judgment, and for that reason I discourage it. Town experience such as Mr. Deacon's is useless for rural roads, where the roads are wet and unsheltered; and a road blinded as we see done in towns would be like a ploughed field after a frost. But there is a time,—when the stones have begun to interlock and are settled in

* Mr. Ivison, who signed the article, is responsible for its contents. We felt some doubt about his date.—ED.

place,—when blindage is invaluable, and this is especially necessary in finishing steam-rolled roads. As to horse-rolls, the blows of the horses' hoofs undo what the roller does.

ROBERT PHILLIPS,
County Surveyor for Gloucestershire.

MEASURING.

SIR,—The letter of Mr. Robert Jones, in your issue of March 12, raises a question which ought not to be let drop. He asks why London architects reduce brick walls to rods a brick and a half thick? and suggests the adoption of the Northern (and Midland) "use" of yards one brick thick. Why do either? A new building is planned,—an old one is measured,—in feet. Why, then, should not all quantities be taken in feet also? For surfaces where a larger unit is wanted, we have already (in some trades) the "square" of 100 ft. sup., which might well be made general. Then all measurements taken straight from the plan or building by scale or rule could be put into quantities at once, and the yard relegated entirely to the linen-drapers. Many generations may, indeed, have gone on comfortably in the old way, but will any architect say that he likes, when looking out or receiving prices, to have some in rods, others in feet, some in yards, others in squares, and that he would not prefer to have them comparable at a glance, without any process of reduction?

With the much longer list of materials, and the much finer cutting of their prices, that we have now to deal with, the simplification of our needlessly roundabout methods of measuring would surely be a reform worth making? Could not the "Practice Committee" of the Institute take it up?

A. S. FLOWER.

The Student's Column.

WARMING BUILDINGS BY HOT WATER. XIII.

QUANTITIES FOR HORTICULTURAL WORKS.

WOOD, in his standard work upon hot-water engineering, published a rule for arriving at the quantity of pipe required to raise and keep the temperature of a building to whatever heat was needed. Owing, however, to the complexity of the calculations needed this rule has been little thought of, notwithstanding the very correct result it gave.

The rule in question ran as follows:—"Multiply 125 by the difference between the temperature at which the room is purposed to be kept, when at its maximum, and the temperature of the external air, and divide this product by the difference between the temperature of the pipes and the proposed temperature of the room; then the quotient thus obtained, when multiplied by the number of cubic feet of air to be warmed per minute and this product by 222, will give the number of feet in length of pipe, 4 in. in diameter which will produce the desired effect."

This rule is based upon the fact that every superficial foot of glass which constitutes the glass-house will cool 1¼ cubit of warmed air per minute down to the temperature of the external air. The result arrived at by this rule gives the quantity of 4-in. pipe that is required containing water at about 180 deg. to make good this loss of heat. In calculating in this manner, only the glass has to be considered, wood, brick, and stone work being practically inactive in the transference and loss of heat. The rule is thus good for any shape of house, whether high or low, lean-to or span, and in this respect it is much better in results than the rapid calculating tables that will be spoken of directly. These latter are based upon cubical area, or contents, and consequently a house bounded on one side by a wall would be given the same quantity of pipe as a house having glass on all sides, unless a certain allowance is made.

The working out of Hood's rule would be as follows:—Supposing a grape-house, having 1,000 superficial feet of glass, was required to be heated to 60 deg.; this temperature to be attainable during the coldest midwinter nights. For this purpose it would be necessary to calculate upon the external air being as low as 10 deg. Fahr. Multiply 125 by 50 (difference between the external and the required internal temperatures) = 6,250, divided by 120 (the difference between heat of pipes, 180 deg., and the internal temperature, 60 deg.) = 52, multiplied by 1,250 (cubic feet of air cooled by 1,000 superficial feet of glass per minute) = 65,000, divided by 222 = 293 ft. of 4-in. pipe, to keep up a heat of 60 deg. in the house, when the outer temperature is 10 deg.

All calculations are usually based upon using 4-in. pipe, as 1 ft. length of this is almost exactly a superficial foot, and should any irregular-shaped radiating media be used, then by ascertaining its superficial measurement in feet, its value can be instantly seen. 3 in. pipe is three-fourths of a superficial foot per foot-run, and 2-in. pipe half a superficial foot per foot-run. In other words, if 100 ft. of 4-in. pipe was required to give a certain temperature, it would require 133 ft. of 3 in., or 200 ft. of 2-in. pipe, to attain the same result.

In arriving at the quantity of glass in a glass-house the material of the frames are included, but if they be wood about one-eighth total area can be deducted. If the frames be metal, no allowance can be made, as they reduce the temperature as quickly as glass. In the same way, if corrugated sheet-iron should ever enter into calculation, it can be treated as glass.

As just mentioned, Hood's rule, although possessing accuracy, is rarely, if ever, used. It is hardly suited for the understanding of many who undertake these works. Even those capable of using it give preference to some more expeditious mode of arriving at results, and this has led to the almost universal use of tables based upon cubical contents.

The particular objection to these tables has been pointed out,—viz., that we get a certain quantity of pipe to a given area, quite irrespective of the quantity of glass. This is a great weakness, as it is the glass wholly, and nothing else (except open ventilators), that goes to reduce the temperature. In span and lean-to houses it is sometimes possible to get nearly double the quantity of glass in the former than in the latter, with the same cubical contents; under such circumstances as these, the tables referred to give erratic results, to say the least. It is usual to apply the tables to lean-to houses, and allow a certain additional percentage for span houses, &c.

An example of rapid calculating tables is as follows:—If we have a glass-house, 30 ft. by 10 ft. by 10 ft., we can easily find its cubical capacity or contents is 3,000 ft. If we require a temperature of 60 deg. (Fahr.) when the thermometer registers 10 deg. outside, we must allow 50 ft of 4-in. pipe to each 1,000 ft. capacity, which would amount to 150 ft. of 4-in. pipe for the house in question.

The following table shows the length of 4-in. pipe needed to keep up a given temperature to every 1,000 cubic feet capacity in a glass horticultural building, the pipes being at about 180 deg., and the outer air at 10 deg. or higher:—

Temperature Required (Fahr.) Deg.	Quantity of Pipe to each 1,000 cubic feet capacity. Ft.
90	80
85	75
80	70
75	65
70	60
65	55
60	50
55	45
50	40
45	37
40	35

The above table requires allowances, &c, as follows:—

For span-houses add one-fifth or one-fourth to the above quantities. About the same allowance should be made for any house that has glass on all four sides and top.

The position of the house should be considered. They are invariably placed in a sheltered position when it is possible, but if impossible, then it is desirable to put a little more pipe.

Pipes carried in trenches must be calculated as being one-fourth less effective than those that are exposed; therefore one-third must be added to the quantities given for pipes carried in channels with gratings over. Channels should be as roomy as possible, or the pipes will be still less effective. At least a width equal to the diameter of the pipe used (say, 4 in.) should exist between the pipes and the sides of the channel.

If the boiler is attended to by a gardener or man having some skill in stoking, very different results will be obtained to what will be effected if the reverse is the case. It might almost be taken for granted that a horticultural apparatus will have the best attention, but it is not always the case. If such a thing has to be provided against, then a little extra pipe will meet the trouble, as it only means that the water will not be kept at a regular high temperature, as it should be. This trouble is of common occurrence in residence and buildings works, as the boiler is then very generally attended to by a page-boy or odd man, whose chief idea is to economise the time spent in stoking.

The quantities given in this table, although sufficient and correct for all ordinary purposes, can be increased with decided advantage if cost is not of chief importance. It is quite recognised that a benefit is derived by putting a more than necessary quantity of pipe, in the same way that a fully-large boiler (beyond the size arrived at by calculation) gives better, more reliable, and economical results. In the first place, it is an advantage to have an apparatus that will respond rapidly to whatever attention is devoted to the fire. Then, with an apparatus that would be considered overpowerful in the ordinary way, we can afford to keep low fires, with little attention, and the fires when banked for the night will, without fear of failure, keep up an efficient heat during the night, when they have the least, or perhaps no, attention whatever.

This is a question that should always be prominent in the engineer's mind, viz., that during the daytime, when attention can be and is given to the boiler, and the best results can be easily effected, the natural temperature is higher than at night, and assists matters materially. At night, when the fire is banked and left to smoulder and do the best it can by itself, the temperature registers its lowest point, and if the boiler and apparatus are not fully capable, mischief will be done—sufficient, perhaps, to destroy the work of the season. With all calculations of quantities, heating surfaces, &c., the coldest winter temperature has to be guarded against, with a fire that is left, perhaps, all the night through without attention.

It has been mentioned how uncertain the results must be with a table based upon cubical contents, especially when comparing lean-to and span-houses in which the quantity of glass varies to such a great extent. This variation, however, can be met by a fixed allowance as just shown, but the quantity of glass varies in other ways. Supposing we have two glass-houses of exactly the same height and width, but one measuring 15 ft. and the other 30 ft. in length, here we get exactly double cubical capacity, but not double the quantity of glass (the glass being the sole cause of heat-loss as explained). In this case no harm would ensue, as by calculation we should give the smaller house sufficient pipe and the larger house too much. The only objection would be, that assuming the job to be one in which cost was of primary importance, we should be spending money on pipe unnecessarily in the larger house. It will be understood that the difference in quantity of glass occurs by the fact that the 30 ft. house has but two glazed ends, whereas two 15 ft. houses would have four glazed ends.

Another example may be illustrated in a high-domed conservatory or a palm-house. With these we get double the cubic contents (or more) of a low glass-house, but not double the glass area. In this case, if we get a more than exact quantity of pipe, certainly no harm ensues, for in high houses we require a full sufficiency of pipe, as the heat, or, rather, heated air, rises, and gets out of the way at the top more quickly than is desirable.

Hood plainly saw the fault that the complexity of his rule gave rise to, and compiled a table of figures which greatly simplified matters, although it still remained based upon the glass-area, and not cubic contents. A cubic contents table was also given by Hood, but not willingly, as it was opposed to the exactitude of his general information. Although errors crept in here and there, his work has been practically beyond criticism, and has only fallen behind by reason of its age, which made it somewhat unsuited to modern practices and requirements. An excellent new edition of this work has, however, now been published.

When an apparatus is first tested, some idea of its efficiency can be gained by the time it takes to heat up the previously cold and possibly damp interior. Of course, accuracy is rather out of the question, as results will vary with the normal temperature of the air. If an apparatus be erected in the summer time, it is difficult to judge its efficiency except by feeling the temperature of the pipes, and having con-

fidence that the quantity of pipe is sufficient. If, on the other hand, the first trial of the apparatus be made in cold weather, the time occupied in getting the interior of the house to its required heat should be about as follows:—

Width	4-in.	pipe	...	4 hours.
„	3 „	„	...	3¼ „
„	2 „	„	...	2½ „

A perfectly dry house would be heated in less time than this, for with moisture (water) we have a substance that possesses a great affinity for heat. Moisture is a very necessary feature in all glass-houses, and its presence materially delays the heating up of the air. When the apparatus is first getting warm, it is the air and moisture alone that takes up the heat; after the air becomes somewhat warm, the glass begins to transfer the heat from the air in contact with it to the outer air which is in need of it. A familiar example of this is the cold downward current of air that always exists near windows, this down current being air robbed of its heat by contact with the glass, and being thus rendered heavier than the general air of the room. It is much like the circulating action of hot water, but reversed as to the cause.

GENERAL BUILDING NEWS.

PROPOSED TECHNICAL SCHOOL FOR SALFORD.—Mr. Arnold Taylor, an inspector of the Local Government Board, held an inquiry at the Salford Town Hall, in respect of an application by the Salford Corporation for sanction to borrow 55,000*l.*, under the provisions of the Municipal Corporations Act and the Technical Instruction Act, 1889, for the provision of a school of technical instruction in the borough. Plans of the proposed new school were exhibited on the walls of the committee-room where the inquiry was held, and the details were explained to the inspector by the architect, Mr. Henry Lord.—The Town Clerk, in supporting the application of the Corporation, said the purchase of the land was put at 1,833*l.*, and the cost of the erection of the school buildings at 43,500*l.* The subjects proposed to be taught in the school included chemistry, building construction, machine construction and drawing, magnetism and electricity, mechanical engineering, and theoretical mechanics. After the inquiry closed the inspector visited the site of the proposed school.

NEW CLUB, LINCOLN.—On the 9th inst. a Liberal Club building was opened at Lincoln. The building is situated between St. Swithin's-square and Waterside. The approach to the building, which is of red brick with stone dressings, is from the first-named street. A vestibule leads into a large central hall. On the left of the vestibule is a reading-room, 26 ft. by 22 ft., and on the right is a corridor leading to two offices. At the back of this corridor, on the west side of the building, there is a lecture-hall, capable of seating 500 persons. It is 60 ft. by 30 ft., and has at the end two cloak-rooms and the usual offices. On the left of the central hall is a refreshment bar, and beyond, on the east side, is a smoke-room, 32 ft. by 22 ft. The first-floor is reached by a staircase from the central hall. The billiard-room, 62 ft. by 26 ft., occupies the entire front of the building on the first-floor, and two French windows in it give access to a verandah, 22 ft. long, over the main entrance. A room, 24 ft. by 22 ft., is set apart for games, and there is also a lock-up library, 15 ft. by 10 ft., on the first floor. Adjoining it is the directors' room, 16 ft. by 14 ft. The caretaker's rooms are also situated here. In the basement there is a cellar, 76 ft. by 28 ft., a club kitchen, two hot and cold water baths, and the apparatus for heating the club. The architects were Messrs. Sington & Brameld, of Manchester; and the contractors Messrs. Lansdown & Son, of Lincoln.

CO-OPERATIVE STORES, SEATON BURN.—On the 19th inst. new branch stores at Seaton Burn, belonging to the Cramlington Co-operative Society, Limited, were formally opened. The buildings comprise upon the ground floor dry goods and flour warehouses, with large cellar underneath, grocery and drapery, boot and shoe, and hardware departments, greengrocery and vegetable store, butcher's shop, slaughter and hanger-houses, oil store, and the usual conveniences. Upon the first floor is a large hall 65 ft. by 36 ft., capable of holding 500 adults, and two ante-rooms. The ventilation is by means of Messrs. Boyle's air-pump ventilator; the heating by hot-water pipes, the apparatus having been fixed by Messrs. Henry Walker & Son, engineers, Gallowgate, Newcastle; the seating by the North of England School Furnishing Company, Darlington; and patent roller shutters by Messrs. Francis & Co., London. The architect for the buildings is Mr. J. G. Crone, 50, Grainger-street, Newcastle-upon-Tyne, and the contractor was Mr. Amos Gray, of North Gosforth, while the clerk of works was Mr. Amos Gray, jun., Wide-open. The internal fittings are carried out in pitch-pine, also the cleading of walls and ceilings, and the cost of the buildings has been 2,250*l.*

FORESTERS' HALL, PLYMOUTH.—On the 19th inst. a new Foresters' Hall, which has been erected at the Octagon, Plymouth, was opened. The building is three stories high, and is built of local stone with Portland stone dressing and stucco front. On the ground floor, on the left of the entrance lobby, is an apartment intended as the district secretary's office, and approached through a small waiting-room. Behind it is court-room No. 1. The large hall is approached through a passage leading from the Octagon entrance to a circular porch, which opens through swing doors into the hall. The latter is 66 ft. long by 28 ft. 6 in. wide, and lighted from the top by a double sky-light, the framework being formed of steel, filled with Hellwell's patent glazing. At the upper end a platform will be erected, and seating accommodation will be provided for 500 persons. Behind the hall is a kitchen, and over it a retiring-room for ladies. Emergency exits open out into Bath-lane. On the second floor of the main building are two additional court-rooms; overhead are the caretaker's apartments. All the court-rooms are fitted with mica flap ventilators, the window being filled with cathedral stained-glass. There are also cloak-rooms and lavatories, fitted with Sicilian marble ware, for both ladies and gentlemen. The premises have been erected by Mr. S. Harvey, Plymouth, from the designs of Mr. H. J. Snell, architect. Mr. G. H. Julian has been clerk of works.

BAPTIST CHAPEL, LAUNCESTON.—On the 17th inst. the foundation-stone was laid of a Baptist Chapel, which is to be erected in the Western-road, Launceston. The building, designed by Mr. Otho B. Peter, architect, Launceston, will be of Gothic style. A gable end and porch of cut and dressed stone will face the Western-road. Seating accommodation will be provided for 120 persons, the seats and sittings being of pitch pine. Underneath the chapel will be a school-room. The building is to be heated throughout by hot-water pipes. Mr. G. H. Strike is the contractor.

SANITARY AND ENGINEERING NEWS.

HEMSWORTH WATERWORKS.—On Wednesday, March 9, a Local Government Inquiry was commenced at Wakefield relative to an application of the Hemsworth Rural Sanitary Authority for a provisional order to acquire lands and easements otherwise than by agreement. Major-General Crozier presided. There was no opposition on the part of the landowners concerned, but the project, which is to supply water to no less than nine townships, was opposed by ratepayers in some of the contributory places, and the inquiry was adjourned to Monday, the 14th inst., and again to March 29. The scheme is to supply an ultimate population estimated at 25,000, with 350,000 gallons of water to be purchased from the joint Boards of Dewsbury and Heckmondwike, with whom a provisional agreement has been completed. The water is derived from the moorlands at the head waters of the River Don. The works are estimated to cost about 28,000*l.* The supply will be by gravitation. Mr. M. Paterson, M.Inst.C.E., gave evidence, and stated that he had investigated the existing supply, which consists of surface wells and springs, more or less polluted, and entirely inadequate to the needs of the district; that he had failed to find a sufficient local supply, and that this was the best and cheapest scheme for a combined supply. He also stated that it had been agreed to supply the high levels of two townships on the line of pipes, and also the township of High Hoyland. The chairman (Col. Ramsden), Dr. Coleman (medical officer), and others gave evidence.

FOREIGN AND COLONIAL.

FRANCE.—A committee has been formed to raise a monument at Paris to M. Alphand.——M. Achille Jacquet has been elected a member of the Institute, in place of the late Henriquel Dupont. ——On the recommendation of M. Daumet, the ten pupils who have entered in competition for the Prix de Rome in architecture have been given as a subject "Un Musée d'Artillerie.——The "Société des Amis des Arts" at Dijon is to open its seventh exhibition of painting, sculpture, and architecture on June 1. The exhibition is to be open till July 5.——The "Société Académique d'Architecture" of Lyons proposes to architects (French and foreign), for the subject of the competition of 1892, "Une École de Commune," to be erected on a site at Lyons. The first prize will be a gold medal and a sum of 200 francs; the second a silver medal, and the third a bronze medal. The designs must be sent, carriage paid, to the Palais des Beaux-Arts at Lyons, addressed to the Secretary of the Society, before December 1 of this year.——Six French architects have sent in competition designs for a cathedral for Tunis, but no decision has yet been arrived at.——A monument to the painter Angevin Bruneau is to be erected in the cemetery at Rueil (Seine-et-Oise). ——The sculptors Desca, Escoula, and Mathet are commissioned to make the model for a monumental fountain for the town of Tarbes (Hautes-Pyrénées).——The Société des Amis des Arts at Cognac is organising an art-exhibition in that town, to open on June 1.——M. Manceau, a former pupil of Cabanel, has been appointed professor of drawing at the College of Beauvais.—— The death is announced of Madame Jenny Gaupillat, sculptor, author of a fine bust of Mdlle. Marie Bashkirtseff exhibited in the Salon of 1886.——M. Gabriel Emanuel Faraill, a talented sculptor, has died suddenly at the age of fifty-four. He was a pupil of Oliva and Farochon. From 1886 to 1891 he exhibited at the Salon various statues and busts remarkable for their conscientious execution. Among his works may be mentioned a figure of a young girl which gained a third medal in the Salon of 1886, and a large bronze statue of the painter Rigaud which stands in one of the public squares at Perpignan, after having figured in the Salon of 1889.——A fine paining by Mantegna, representing the martyrdom of St. Sebastian, in the parish church of the small town of Aigueperse (Puy-de-Dôme), has been seriously damaged by some person unknown.

BERLIN.—The proposed metropolitan overhead railroad scheme is apparently to be carried out without much delay. The electrical engineers, Messrs. Siemens & Halske, have altered their route in accordance with the wishes of a special committee which had criticised their scheme for the authorities when first mooted. The altered plans have been put before the Police President for approval, and he has sent them to the Minister of the Interior with his recommendation. If the Minister's approval be obtained at once, the preliminary works are to be commenced this summer; and, if this be the case, the new line can be opened in 1894.——The Emperor wishes to have some of the old houses in the vicinity of his "Schloss" pulled down. This proposed extension of the "Schlossfreiheit" will require a large sum of money. For the purpose of raising the necessary funds, the Emperor wishes again to have recourse to his favourite "lottery" system. The Privy Counsellor in whose department the matter would have to be settled has apparently refused to help the Emperor this time. He has asked for his dismissal from his unpleasant post, and will receive it.—— According to the annual report there is a decrease in the number of members in the older of the two architectural societies, "Der Architekten Verein zu Berlin." The number is 1,849 this year; it was 1,887 last year. This is probably due to the popularity of the new "Vereinigung." The library has 11,786 volumes.——A third society has been founded; its name is "Skitze," and it will have a large number of juniors on its roll.——The money for the Berlin Cathedral being forthcoming, the old "Dom" is now to be pulled down and an iron church put up for the use of the parish during the years in which the new building is to be erected. 20,000*l.* are at the disposal of Professor Raschdorff for this purpose.——The total cost of the eight covered markets lately erected is 829,900*l.*

MUNICH.—The *Deutsche Bauzeitung* states that the preparations for the Munich International Art Exhibition this summer have progressed wonderfully well. Besides a good show of Bavarian and North German work there is to be a good representation of Spanish art. Hungary is expected to send a large collection of paintings, and it is hoped that Scotland will be fairly represented. A member of the managing committee has gone over to America to bring over a collection of paintings from the United States. As to the architectural group, we hear that there are to be some specimens of von Hansen's, von Ferstel's, and the late Semper's drawings on view in separate rooms.

SWITZERLAND.—Nineteen designs were sent in for the proposed concert-halls and assembly-rooms to be erected at Zurich. The competition for this imposing block has been won by Herr Bruno Schmitz, the "memorial monument specialist" at Berlin. He had also won the preliminary competition some time back.

MISCELLANEOUS.

WREN'S LIBRARY AT LINCOLN.—At a numerously-attended meeting of the Society of Antiquaries, on Thursday, March 17, Dr. John Evans, F.R.S., President, in the chair, the following resolution was unanimously adopted:—"That the Society of Antiquaries of London hears with much regret that the Dean and Chapter of Lincoln have avowed an intention to pull down the north walk of the cloister of their church, and the library over it, in order to build on the same site an imitation of the other three sides of the cloister, which are of the fourteenth century; against this proposal the Society desires to protest as strongly as it can, and at the same time to point out that the existing building, which is the work of Sir Christopher Wren, is a good piece of architecture, well fitted to its place, and convenient for the uses for which it was intended, whilst the substitution of new work in its place will be a falsification of history, and there will be little compensation for the loss of Wren's building, even if the ornamental parts of it should be worked up, as has been proposed, into

another building on another site." On the proposal of Sir H. B. Bacon, Bart., seconded by Mr. C. J. Ferguson, it was unanimously resolved "That a copy of the resolution be forwarded to the Dean and Chapter of Lincoln."

CENTENARY OF "THE BATH HERALD."—We have received from the proprietors of the *Bath Herald* an interesting account of the history of that journal, which has lately celebrated its centenary. We have also received a *fac-simile* copy of the first number of the *Herald*, which bears date March 3, 1792. It is admirably printed in old-style type supplied by Messrs. Caslon & Son. The contents of the number include news of the death of Sir Joshua Reynolds, of whom it speaks as follows:—

"THURSDAY, FEB. 23, Died, much lamented by his numerous friends, in the 69th year of his age, Sir JOSHUA REYNOLDS, Knight, President of the Royal Academy.—Genius was his, not confined merely to his own peculiar art, for his talents were truly various. He was the first of Painters, because he chose to be so: he might have stood with BURKE in Oratory, or MALONE in Criticism and elegant Literature, if either had been his subject.

His compositions, chiefly discourses on the art he professed, are marked by an attic elegance of expression, clearly the result of the harmony of his mind. SHAKESPERE owes to him some very beautiful elucidations, and his country, her school of painting.—Virtue, however, bestows the best praise. He was a firm friend, a benevolent and honourable man.

His talents of every kind, powerful from nature, and not meanly cultivated by letters, his social virtues in all the relations, and all the habitudes of life, rendered him the centre of a very great and unparalleled variety of agreeable societies. He had too much merit not to excite some jealousy, but too much innocence to provoke any enmity. The loss of no man of his time can be felt with a more sincere, general, and unmixed sorrow."

We quote this as an interesting contemporary testimony to the talents and character of Sir Joshua. The *Herald* also contains some lines to his memory commencing—

"Reynolds, 'twas thine with magic skill to trace
The perfect semblance of exterior grace."

The proprietors have in their possession a file of the *Herald* complete for the whole of the century, and they say that permission can always be obtained to search the file for any legitimate purpose. We congratulate them on the centenary of their excellent journal.

APPOINTMENT OF COUNTY ARCHITECT FOR CUMBERLAND.—Mr. Geo. D. Oliver, F.R.I.B.A., of Carlisle, was elected County Architect at the last meeting of the Cumberland County Council.

ISLE OF MAN INTERNATIONAL EXHIBITION, 1892.—Mr. George North, M.I.M.E., of 90, Queen-street, London, E.C., has been appointed representative for London and the South of England for the above Exhibition, which will be opened on July 4 next. Intending exhibitors can obtain all information on application to Mr. North.

THE "GRAVITA" WATER-METER.—This is a new water-meter which appears to ensure accuracy of measurement. It possesses great simplicity of construction, and consists, essentially, of a box divided into two measuring chambers of equal capacity, but so arranged that the narrow end of one chamber is parallel with the wide end of the other. The box being pivoted on centres, it tilts by gravity first to one side and then to the other. The act of tilting transfers the incoming supply from one chamber to the other, and at the same time discharges the contents of the full chamber, and the operation is repeated automatically as long as the water comes in. We have seen something like this meter before, but this embodies some very marked improvements. It is easily adaptable to all existing fittings, and is suitable for use with any pressure of water, and with constant or intermittent supply. It is also capable of being used either in substitution for, or in combination with, existing water cisterns.

DUST-COLLECTING.—The Vestry of St. Pancras has organised a system of dust collection from house to house and street to street, by which the dust will be removed from every house in the parish once a week. The streets and other places in each district are arranged on a consecutive route list, in such order that each street is followed by the nearest adjoining street. The dust-carts being numbered, and the dustmen being compelled to visit each house, every ratepayer is enabled to see that the system is administered to all fairly, and also to secure regularity and efficiency by promptly complaining to the Health Department in case of neglect or irregularity. The dustmen are under instructions to report every case of refusal to allow the dust to be removed, and in the case of repeated and persistent refusal the Health Department will take such action as may be deemed necessary for the protection of health.

THE LARGEST LOG-SAW.—Messrs. A. Ransome & Co. have produced the largest machine-saw for timber-cutting as yet designed. It is intended for Tasmania, where it will have to do with huge logs of blue-gum and other hard woods. The design shows a main standard of a hollow box casting of very strong section, the lower end splayed to a wide base for bolting down to the foundations. The saw pulleys are very large, and adapted to work band-saws up to 9 in. in width. They are accurately turned, and balanced to run perfectly true and steady at a speed of 300 revolutions a minute. The top pulley is constructed of forged steel, the rim being lagged with well-seasoned wood, overlaid with india-rubber cloth, which gives a slightly elastic surface for the saw to bed upon. The bottom pulley is similarly constructed, but is much heavier, to prevent the saw over-running when entering the cut. The pulley-shafts are also of forged steel, and are supported in very long self-lubricating bearings fitted with self-adjusting swivel blocks. There are provided also various means of adjustment of the saw blade to its proper position: for giving its proper tension, and for varying the tension according to the requirements of the sectional areas of the different sizes employed. The feed motion ranges from 6 ft. to 60 ft. per minute, and can be varied by a friction disc whilst the saw is in cut. The log is borne on a separate timber-carriage running on rails. The band-saws of this type now in use will cut at the rate of 80 superficial feet per minute in soft wood, or 50 ft. in oak. The large machine, which a number of visitors inspected on the 17th instant, will accomplish much more than the above result. The huge vertical post or standard is 16 ft. in height, with pulleys 8 ft. in diameter, making the total elevation 21 ft. over all, and the jaws between the pulleys will deal with logs of 7 ft. diameter,—the actual cut being 6 ft. 4 in. The effective running speed of the saw-edge is 7,000 ft. per minute. Any intelligent sawyer can readily be trained to work the saw, but, doubtless, the instructions must be strictly followed. Two men are required at the cutting,—the sawyer who remains by his saw, and another man who rides on the timber-carriage. This carriage is an important portion of the arrangements, and is constructed with a strongly-bolted wood framing furnished with iron-clips for rapidly fixing the log. Other devices enable the log when laid on the carriage to be gripped by the operation of one lever and dealt with by the man who rides on the carriage. The same man can also work another lever which sets the log clear of the saw when running back. The movements of the log-carriage are so rapid that the loss of time when a log of 30 ft. is being sawn is only a few seconds. Special tools are provided for automatically sharpening the saw, for slightly stretching when the back or front edge has varied in tension by reason of being heated in working, and the band-saw itself, if broken, can be brazed together and re-adjusted to its working duty.

BUILDING TRADE WAGES IN HAVRE.—According to a recent report of the United States Consul at Havre on wages and food prices in that locality, the rates paid in the building trade are:—Blacksmiths, per day of ten hours, 5s. 2½d.; bricklayers, per day of ten hours, 5s. 2½d.; labourers, per day of twelve hours, 2s.—2s. 4½d.; cabinet-makers, per day of ten hours, 4s. 10d.; carpenters, per day of ten hours, 4s. 0½d.; gasworks' employés, per day of ten hours, 2s. 10d.—4s. 10d.; painters, per day of ten hours, 4s. 10½d.; paper-hangers and decorators, piece-work, rate not fixed; plasterers, per day of ten hours, 6s. 5d.; plumbers, per day of ten hours, 5s. 7½d.; apprentices, per day of ten hours, 1s. 6½d.; stone-cutters, per day of ten hours, 5s. 2½d.; teamsters, per day of twelve hours, 3s. 4½d.; water-works' employés: fountain men, per year and after, 72*l.* 7s. 6d.; twenty-five years' service pensioned on half-pay; labourers excavating canals, per day of ten hours, 2s. 4½d.—2s. 10d.; labourers, street, per day of ten hours, 1s. 7½d.

ROYAL INSTITUTION.—The lecture arrangements after Easter include the following:—Professor T. G. Bonney, two lectures on "The Sculpturing of Britain—its later Stages" (the Tyndall Lectures); Mr. Frederick E. Ives, two lectures on "Photography in the Colours of Nature"; Professor Dewar, four lectures on "The Chemistry of Gases"; and Professor H. Marshall Ward, three lectures on "Some Modern Discoveries in Agricultural and Forest Botany" (illustrated by lantern).

THE ENGLISH IRON TRADE.—With the return to work of the federated colliers, the English iron market has become more settled, but the Durham miners' strike has caused a state of stagnation in the Cleveland district. The troubles with the men have somewhat strengthened pig-iron prices, but very little is doing in either crude or manufactured iron. In the tinplate market the tone is still dull. The steel trade shows little alteration, but prices of heavy rails have recovered from last week's decline. Blooms, on the other hand, have receded. Shipbuilding-yards are in a depressed state generally, and engineers, on the whole, are slack. The coal trade is quieter.—*Iron.*

BRITISH ARCHÆOLOGICAL ASSOCIATION.—At the meeting of this Association, on the 16th inst., Mr. C. H. Compton in the chair, it was announced that an invitation had been received from the Town Council of Cardiff to hold the forty-ninth Congress of the Association in that town in August, and that the invitation had been accepted. The Marquis of Bute will read a paper, and has accepted the office of patron. Mr. Earle Way exhibited some interesting pieces of Roman pottery and others of later date, which had formed part of the Gwilt collection of objects found in Southwark. Mr. W. de Gray Birch, F.S.A., read some notes on a series of seals, mostly unpublished, of the Abbots of Rievaulx. A cast of a curious seal of Hyde Abbey was also exhibited, showing the head of St. Valentine, which had been purchased by a Royal donor at great cost. Mr. Macmichael exhibited a large collection of yellow glazed ware, of fifteenth-century date, found in excavations near Charing-cross. He also read some notes on some of the signs of the old trading firms of London and its vicinity, and produced numerous old engravings and sketches of the various signs referred to. A paper was then read by Mr. R. Lloyd on the history of the Guelph family.

A PIPE BENDER.—Messrs. C. Winn & Co., of Birmingham, send an illustration of Billing's patent device for bending lead pipes without flattening the pipe. It consists of a long spiral spring, tapered at one end and with a loop at the other end to pull it out. The coil is inserted in the pipe before bending, and preserves its circular section; after the operation it is drawn out by the loop referred to.

CLOCK, HUDDERSFIELD CORPORATION SEWAGE WORKS.—The Huddersfield Corporation having selected the firm of Messrs. Potts & Sons, of Leeds, to supply the new bell and make the new clock for the new sewage works at Deighton, the work has been put in hand by them from instructions received from Mr. R. S. Dugdale, the Borough Surveyor, and is now nearly completed. The time is shown upon four large external skeleton cast-iron dials, filled in with white opal glass for illumination. The hours are struck upon a large bell of bell-metal.

THE "BELVOIR" STOVE.—Amongst the exhibits of Messrs. Walter Monnery & Co., at the Building Exhibition, is the "Belvoir" tiled register stove, which possesses some points meriting attention. The back of the stove is entirely of firebrick, and slopes forward towards the top. This arrangement promotes perfect combustion, and makes the heating-power of the stove much greater than that of a stove with a vertical back. The bars are of ¼ in. iron, and are arranged vertically, 1 in. apart. The bottom grate consists of a fine mesh. It is claimed that this stove combines the advantages of an open fire with those of the slow combustion stove designed by Mr. Pridgin Teale. The canopy is movable. Messrs. Monnery & Co. also exhibit their well-known wall-ties, kitcheners, the "Larbert" self-setting ranges, and general builders' ironmongery.

LEGAL.

CASE UNDER THE METROPOLITAN BUILDING ACT.—FEE FOR IRREGULAR BUILDING REMOVED.

FLETCHER *v.* LEWIS.

THIS summons was heard at the Lambeth Police-court, on the 15th inst., by Mr. Hopkins, the presiding magistrate, which had been taken out by Mr. Banister Fletcher, the District Surveyor for West Newington and part of Lambeth, against Mr. Lewis, of No. 56, Penton-place, Walworth, for refusing to pay the fee for surveying a shed used as a store for paraffin, &c., in the rear of 56, Penton-place, Walworth.

It appears that the District Surveyor discovered the shed had been erected, and, after surveying it, gave notice to the defendant, who was his own builder, to amend the irregular work, as required by the Act, by enclosing the shed with brickwork, &c.; but, instead of doing this, the building was taken down, after which the District Surveyor demanded his fee in respect of the building, which, being refused, the present summons was taken out.

The defendant argued to the effect that no fee could be claimed unless there was a permanent building, built in conformity with the Act, and that if the building were taken down, the District Surveyor had no claim.

Mr. Banister Fletcher claimed that under clauses 49 and 51, taken with schedule 2, a fee is assigned for every new building surveyed by the District Surveyor, and that such fee accrues immediately on the covering in of the roof, and is payable one month thereafter, and argued that the removal could not affect the question.

The magistrate decided that the District Surveyor was entitled to his fee of 15s., and made an order for payment of the same, with the amount of costs asked for (12s. 6d.).

MEETINGS.

SATURDAY, MARCH 26.

Edinburgh Architectural Association.—Visit to the Antonine Wall near Kilsyth.

MONDAY, MARCH 28.

Surveyors' Institution.—Professor E. Kinch on "The Valuation of Feeding Stuffs and Foods." 8 p.m.

Society of Arts (Cantor Lectures).—Mr. Bennett H. Brough on "Mine Surveying." I. 8 p.m.

Leeds and Yorkshire Architectural Society.—(1) Lecture by Mr. G. Corson. (2) Nomination of Officers. 7.30 p.m.

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Nature of Work.	By whom Advertised.	Premium.	Designs to be delivered.
*New County Council Buildings	Staffordshire C. C.	150*l.* 100*l.* & 50*l.*	May 27

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Making-up and Paving Road	Lewisham Bd. of W.	*Official*	Mar. 29
*Making-up and Paving Road	Bromley Loc. Bd.	do.	do.
Estorts, Fire-bricks, &c.	Cleckheaton Loc. Bd.	do.	do.
Macadam and Paving Setts	Sale Loc. Bd.	A. G. McBeath	do.
Flagging, &c.	Plymouth Corp.	G. D. Bellamy	do.
Restoration of Farndon Church, near Newark	.....	C. Hodson Fowler	Mar. 30
Two Semi-detached Houses, Stanningley, Leeds	Joseph Brooks	W. D. Gill	do.
Market Buildings	Plymouth Corp.	*Official*	do.
Four Houses, Low Wincobank, Rotherham	J. Tanton	J. Platts	Mar. 31
Additions to Property, Bramley-lane, Lightcliffe, Halifax	.....	Sharp & Waller	do.
Granite Road Metal	Pontefract Corp.	Jas. Heseltine	do.
Kerbing, Flagging, &c.	York Corp.	A. Creer	do.
Thirteen Artisans' Dwellings and Three Shops, Hipperholme, Halifax	.....	Jos. F. Walsh	do.
*Painting Works	Midland Railway	*Official*	April 1
Gasholder Tank	Normanton Gas Co.	do.	do.
Alterations and Additions, Police Station, Pontypridd	Glamorgan C. C.	do.	do.
*Supply of Materials	Walthamstow L. B.	G. W. Holmes	do.
Improvement of Cragg-lane, &c.	Ovenden Loc. Bd.	Utley & Gray	April 2
Timber, Wire Rope, &c.	Lanc. & Yorks. Ry.	*Official*	April 4
Pumping Engines and other Machinery	Horbury Local Board	S. Shaw	do.
Sewage Works	do.	do.	do.
*Sewers and Road Work, &c.	Bourne Estate, Windsor	Thomas & Taylor	do.
Alterations, Ruskin Museum	Sheffield Corp.	C. F. Wike	April 5
*Sewerage Works	Leyton Local Board	W. Dawson	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor or Engineer.	Tenders to be delivered.
*Construction of Portion of Canal	Manchester Ship Canal Co.	*Official*	April 8
*Sewerage Works	Oldbury Local Board	H. B. Nichol	do.
Eighteen Houses, Consett, Durham	Consett Indus. and Prov. Soc.	W. S. Shell	April 11
*Making-up Roads	Southgate Local Board	C. G. Lawson	do.
*Roadmaking Works	Bournemouth T. C.	F. W. Lacey	do.
*Paving Works	West Ham Council	Lewis Angell	April 12
*Making-up Road	do.	do.	do.
*Circular Iron Urinal	do.	do	do.
Stone Arched Bridge, Brook Houdd	Abergavenny High Bd.	John Gill	do.
Widening Roads, Bassalleg	Newport (Mon.) High Board	*Official*	do.
*New Market, Arcades, and Shops	Borough of Halifax	Leeming & Leeming	do.
*Cleansing and Painting Works, S. W Fever Hospital	Met. Asylums Board	T. W. Aldwinckle	April 14
*Forty New Arches, &c. &c.	Brighton Town Coun.	F. J. C May	do.
Technical School	Halifax Corporation	Jackson & Fox	April 21
Houses, Broomfield-terrace, Headingly, Leeds	W. B. Pearson	.....	No date
Four Cottages, Beeston-hill, Leeds	.....	T. E. Farmery	do.
Mission Rooms at St. John-the-Baptist Church, Newtown	.....	Arch. Neill	do.
Alterations and Additions to St. Michael's Schools, Leeds	.....	Richd Wood	do.
Shop and Warehouse, Land's-lane, Leeds	.....	Ambler & Bowman	do.
New Roofs on Nave and Chancel, Bishops Norton Church, Lincoln	.....	Goddard & Son	do.
*Offices, Warehouses, Stables, &c. Southampton	.....	A. W. Galbraith	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Road Foreman	City of Birmingham	2*l.*	Mar. 30
*Clerk of Works	Teddington Loc. Bd.	Not stated	April 4

Those marked with an Asterisk (*) are advertised in this Number. *Competitions, p.* iv. ***Contracts, pp.*** iv., vi., & viii. *Public Appointments, p.* xx.

TUESDAY, MARCH 29.

Institution of Civil Engineers.—Further discussion on Mr. A. R. Binnie's paper on "Mean or Average Annual Rainfall, and the Fluctuations to which it is Subject." 8 p.m.

Society of Arts (Applied Art Section).—Mr. E. Roscoe Mullins on "The Decorative Uses of Sculpture." 8 p.m.

WEDNESDAY, MARCH 30.

Builders' Clerks' Benevolent Institution.—Fourteenth Annual Dinner, Holborn Restaurant. 6 p.m.

Institution of Civil Engineers.—Students' Visit to the Works of Messrs. W. H. Allen & Co., York-street, Lambeth, S.E. 2 p.m.

Civil and Mechanical Engineers' Society.—Mr. A. Wollheim on "Modern Sewage Precipitation Works." 7 p.m.

Builders' Foremen and Clerks of Works' Institution.—Quarterly meeting of the Directors. 8 p.m.

THURSDAY, MARCH 31.

Society of Antiquaries.—8.30 p.m.

Royal Institution.—Dr. B. A. Whitelegge on "Epidemic Waves." 3 p.m.

FRIDAY, APRIL 1.

Architectural Association—Mr. Horace Townsend on "Literature and Architecture." 7.30 p.m.

Royal Institution.—Professor Oliver Lodge on "The Motion of the Ether near the Earth." 9 p.m.

SATURDAY, APRIL 2.

Architectural Association.—Visits to (1) the Newington Weights and Measures Offices, Union-road, Blackman-street, S.E. by permission of Mr. Thomas Blashill-3 p.m. (2) the Royal Ophthalmic Hospital, St. George's-circus, S.E., by permission of Mr. Keith D. Young. 4 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

3,971.—SASH-FASTENER: *J. A. Piccaver.*—This invention refers to an economical, effective, and simple fastener of window-sashes and the like. On the meeting-rail or bar of one window-sash is secured a metal plate carrying a staple through which has been passed a link of oval shape, the link being free to work in the staple, but otherwise firmly secured therein. On the opposite meeting-rail is secured a corresponding metallic plate, carrying in place of the staple and link a pin or pivot with a flat curved head or thumb-piece over which the link may be passed. The head is then turned and the link secured.

[The invention was illustrated and described in the *Builder* for December 12, 1891, p. 448.]

6,041.—BRICK-KILNS: *J. Craven.*—This refers to an invention for providing means whereby the heat from the chambers of kilns in which bricks or other articles have been burnt can be introduced to the chambers in which green goods are contained, so that the heat from the first-named chambers is utilised in drying the green goods. A metal main-pipe is led in proximity to each chamber of the kiln, and from each chamber a branch pipe leads into the said main pipe, which has in connexion with it an air drawing and forcing device. The branch pipes are each provided with valves or dampers, by which their communication with the main pipe can be closed. The branch pipes communicate with the openings in the crown of each chamber. When it is desired to pass the air from a chamber from which the charge is being drawn into a chamber containing green goods, the valves or dampers are operated so that the communication between the two chambers is established, and the air-forcing and drawing device being set in operation, the hot air is drawn from the chambers from which the charge is being drawn, and delivered into the chamber containing the green goods at the lower part, which may be done by means of descending pipes introduced into the openings in the arch, with which the branch pipes communicate.

6,142.—PIPE-JOINTS: *T. R. Murray.*—This patent refers to an improved joint for wrought-iron, steel or other metallic pipes, so as to remain quite tight when subjected to very high pressure. Each pipe-end is made with a thickened collar, and the joint face of one pipe-end of a pair is made with an annular projecting rib, the joint face of the other pipe-end of a pair being made with an annular recess or rebate, into which the projection enters when the two pipe-ends are brought together. Lead or other suitable slightly-compressible material is put into the annular recess to make the joint tight. The pipe-ends are fixed together by means of screw-bolts, which connect rings fitting, or nearly fitting, on the pipes, and bearing against the inner sides of the collars on the pipe-ends; or lugs may be formed on the collars to receive the screw-bolts, by means of which the pipe-ends are fixed together.

6,257.—KILNS: *W. C. Gibson.*—This invention relates to kilns for biscuiting and burning clay goods which are to be glazed or enamelled, and has for its object to so construct such kilns that the waste heat from the burning or glazing muffle is utilised for heating the biscuiting kiln, a great saving in fuel being thereby effected. The inventor constructs a kiln for glazing or enamelling the clay goods. The kiln is a muffle kiln, as the burning chamber must, of course, be free from smoke or other impurities. Beside, near to, or as a part of this kiln is constructed a second kiln or chamber for biscuiting the ware. This kiln is also preferably a muffle. By means of one or more vents the waste heat is conducted into the biscuiting kiln to heat it up. By means of dampers these vents may be closed, or partially closed, at any time. A flue with damper door may be arranged in connexion with each kiln. When the twin kilns are working simultaneously, the flue of the glazing kiln may be closed, so that the waste gases may pass to and heat up the biscuiting kiln. When the biscuiting kiln is not used the dampers in the connecting vents may be closed, and the flue of the glazing kiln opened.

1,052.—PARQUET FLOORING: *J. T. Chappell.*—This invention relates to the preparation of pieces of wood used for parquet or block-flooring, and to the joining and laying of the same to ensure their firm fixing and junction. Each piece of wood is made with an ogee moulding at its lower edge, and with a groove to receive metal dowels.

NEW APPLICATIONS FOR LETTERS PATENT.

March 7.—4,445, G. Pawson, Securing Knobs to Brass Mountings of Door and other Furniture.—4,448, T. Jackson, Grates and Fireplaces.—4,496, J. Holliday, Artificial Stones.

March 8.—4,511, S. Turner, Fireproof Floor.—4,518, A. Carey, Hydraulic Lifts.—4,525, H. Fitzpatrick, Glass Bricks.—4,531, C. Horrell, Sash-fasteners for Windows.—4,534, T. Shurmer, Bricks.—4,538, I. Irlam, Bricks.—4,540, G. Graham, Building or Paving Blocks.—4,553, J. Knights, Burning Portland Cement.—4,572, W. Macnamara, Stops for Gates.—4,573, T. Whale, Valves in Water-closet Cisterns.—4,590, A. Thrower, Girders.—4,598, C. Adams, Machines for Sanding Brick Moulds.—4,624, J. Cohn, Water-closets, &c.

March 9.—4,656, R. Harrison, trading as Loach & Clarke, Devices for Opening, Closing, and Adjusting Windows, &c.

March 10.—4,751, A. Bromley, Open Firegrates.

March 11.—4,790, T. Robinson, Self-acting Cross-cut Saw-benches.—4,791, T. Bradbear, Closet Fittings.—4,826, P. Pierpoint, Smoke or Ceiling Protectors for Chandeliers, &c.—4,842, T. Johnson, Garden Tile or Ridge.

March 12.—4,871, T. Robinson, Connecting Metal Pipes to the Basins or Traps of Water-closets, &c.—4,913, E. Peters, Chimney-tops or Terminals.

PROVISIONAL SPECIFICATIONS ACCEPTED.

536, J. Robson, Sash-fasteners.—1,023, S. Middleton, Operating Window-sashes.—1,129, A. Fowler, Automatically Flushed Water-closets.—1,170, J. Leach & J. Lewis, Fastening Window-sashes.—1,693, E. Harvey, Water-closets.—1,942, S. Renschel, Handles for Furniture-drawers, &c.—1,945, A. Smith and J. Emery, Centre Revolving-ball in Taps.—2,018, W. Day and E. Eden, Safety-ladder Hook.—2,091, W. Blackband and E. Charles, Door-knobs, &c.—2,131, F. Stokes, Continuous treatment of Lime, Cement, &c., and in the Lining of Kilns and Furnaces for Burning Cement, &c.—2,358, C. Baker, Gates.—2,385, M. Hallam, Rack-pulleys for the Cords of Window-blinds.—2,392, W. & E. Freeman, Flushing-tanks of Water-waste Preventers.—2,453, H. Sutcliffe, Water-closet Basins, and in means for Ventilating the Soil-pipes of same.—2,951, C. Logan, Wire Nails.—2,964, M. Kann, Working-stone.—2,967, H. Woodhouse, Fire-grates or Stoves.—3,016, G. Lawford, Closet Connections.—3,093, J. Carr, Mortising Chisel.—3,201, D. Halpin, Treads for Stairs.—3,266, J. Jones, Drainage Appliances.—3,302, W. Jones, Water-waste Preventer.—3,608, F. Grew, Doors.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

1,154, W. Riley, Knobs or Door-handles, and adjusting and holding them upon their Spindles.—2,713, T. McCulloch, Window-sash Fastener.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

MARCH 10.—By *Worsfold & Hayward* (at Dover): 4, 6, and 7, Chapel-st., Dover, f., r. 36*l.*, 605*l.*; 21 and 22, Biggin-st., Dover, f., r. 80*l.*, 1,430*l.*; 20, Biggin-st. and Malthouse, f., r. 40*l.*, 290*l.*; 23, Pencester-rd., f., r. 36*l.*, 620*l.*; 57, Folkestone-rd., f., 570*l.*; 20, Military-rd., f., 225*l.*; 12, Worthington-lane, f., 220*l.*; 51, Dour-st., u.t. 67 yrs., g.r. 2*l.* 5s., r. 17*l.*, 245*l.*; 7 and 8, Palmerston Cottages, Charlton, f., 245*l.*

MARCH 14.—By *Hince & Lewis*: 19, Morton-rd., Islington, u.t. 51 yrs., g.r. 5*l.*10s., r. 34*l.*, 300*l.*—By *Phillips, Lea, & Davies*: f.g.r. of 15*l.*, with reversion in 79 yrs, Norman-rd., Bow, 380*l.*; 1 and 4, Merton-rd., Wandsworth, u.t. 91 yrs., g.r. 19*l.*, 640*l.*—By *S. A. Lock*: 80A, 82 to 86 (even), Boundary-st., Bethnal-green, c., 945*l.*—By *T. P. Rider*: 77 and 79 Bramley-rd., Nottinghill, u.t. 70 yrs., g.r. 18*l.*, 600*l.*; 6, 8, and 10, Rigeley-rd., Kensal-green, u.t. 87 yrs., g.r. 15*l.* 15s., 390*l.*—By *Rouch & Parkhouse*: 20, Victoria-rd., Stroud-green, u.t. 81 yrs., g.r. 6*l.* 10s., r. 40*l.*, 400*l.*; 45, Drummond-st., Euston-sq., u.t. 18 yrs., g.r. 18*l.* 18s., r. 80*l.* 525*l.*—By *A. G. Windsor*: 38, Almorah-rd., Islington, u.t. 60 yrs., g.r. 6*l.*, r. 40*l.*, 315*l.*; 29 to 37 odd, South-st., u.t. 35 yrs., g.r. 31*l.* 10s., 850*l.*; 2, 4, and 6, Nailour-st., u.t. 59 yrs., g.r. 16*l.* 10s., 450*l.*; 30 and 32, Hyde-rd., Hoxton, u.t. 44 yrs., g.r. 12*l.* 12s., 1,120*l.*; 144 and 146, Shepherdess-walk; and 1, Forston-st., u.t. 7¼ yrs., g.r. 9*l.* and 2*l.*, 185*l.*; 148, Shepherdess-walk, u.t. 6¼ yrs., g.r. 5*l.*, r. 30*l.*, 85*l.*; 39, 40, and 41, Eagle Wharf-rd., u.t. 16¾ yrs., g.r. 15*l.* 15s., 330*l.*

MARCH 15.—By *Debenham, Tewson, & Co*: The letting of 8 and 9, Great St. Helens, City of London, area 3,677 ft., term 80 yrs., at 950*l.* a year; 83, Tooley-st., and 13, Bull-ct., Southwark, f., r. 120*l.*, 2,200*l.*—By *Driver & Co.*: Nos. 49A and 50, and 10, 11, and 12, York-pl., Strand, f., area 2,880 ft., 16,000*l.*—By *Rogers, Chapman, & Thomas*: 29, Redcliffe-gardens, Kensington, u.t. 56 yrs., g.r. 20*l.*, r. 120*l.*, 1,000*l.*

MARCH 16.—By *Inman & Co.*: F.g.r. of 42*l.*, with reversion in 13 yrs., Barnsbury, 1,160*l.*; 59, Lanark-villas, Maida Vale, u.t. 58 yrs., g.r. 10*l.*, r. 50*l.*, 450*l.*; 8 and 9, Goldsmith's-pl., Kilburn, u.t. 52 yrs., g.r. 4*l.*, 405*l.*—By *C. P. Whiteley*: 7, Spencer-rd, Kentish Town, f., 300*l.*; 8, Spencer-rd., u.t. 65 yrs., g.r. 4*l.*, 205*l.*; 10, Spencer-rd., u.t. 66 yrs., g.r. 6*l.* 6s., 185*l.*—By *A. Barton*: 70, New North-rd., Hoxton, u.t. 24 yrs, g.r, 30*l.*, 150*l.*—

By *H. Donaldson*: 7 and 8, Tilley-st., Spitalfields, f., r. 97*l.* 4s., 1,440*l.*; freehold site area 2,000 ft., Widegate-st., 1,550*l.*; profit rental of 60*l.*, 18 and 19, Artillery-lane, u.t. 15 yrs., 175*l.*

MARCH 17.—By *Glasier & Sons*: f.g.r. of 60*l.* 15s., with reversion in 89 yrs., Uxbridge-rd., Shepherd's-bush, 1,495*l.*; f.g.r. of 63*l.*, with reversion in 89 yrs., Armiger-rd., 1,560*l.*—By *Newbon & Co.*: 2, Beresford-rd., Canonbury, u.t. 58 yrs., g.r. 8*l.*, 445*l.*; 6, Annette-rd., Holloway, u.t. 72 yrs., g.r. 6*l.* 6s., 265*l.*; 54 and 56, Minterne-rd., Hoxton, u.t. 17 yrs., g.r. 7*l.*, r. 62*l.*, 350*l.*; 6, Rheidol-rd., Islington, u.t. 24 yrs., g.r. 5*l.*, r. 40*l.*, 290*l.*; 21, 23, and 29, Northampton-st., u.t. 26 yrs., g.r. 12*l.*, 290*l.*; 8, De Beauvoir-crescent, Kingsland, u.t. 37 yrs., g.r. 4*l.*; and a g.r. of 12*l.* (same term), 260*l.*—By *H. J. Bliss & Sons*: 1 to 7 (odd), Baker-st., Bethnal-green, u.t 33 yrs., g.r. 8*l.*, 385*l.*; 60 and 62, Warley-st., u.t. 14 yrs., g.r. 6*l.* 6s., 70*l.*; 19 and 20, Lessada-st., u.t. 40 yrs. g.r. 6*l.* 6s., 300*l.*; 25, Sale-st., u.t. 33 yrs., g.r. 4*l.* 3s. 4d., r. 25*l.*, 225*l.*

MARCH 18.—By *Dolman & Pearce*: 1, Modbury-st., Kentish-town, u.t. 57 yrs., g.r. 7*l.*, 295*l.*—By *Weatherall & Green*: The site of Farringdon-market, E.C., area 75,000 ft., 98,100*l.*—By *D. J. Chattell*: 8 and 9, Dickenson-rd., Crouch-hill, u.t. 89 yrs., g.r. 12*l.* 12s., r. 72*l.*, 590*l.*—By *Rushworth & Stevens*: 16 and 16A, Sandwich-st., Burton-crescent, u.t. 15 yrs., g.r. 50*l.* 8s., r. 75*l.*, 100*l.*; a profit rental of 40*l.*, u.t. 15 yrs., on same houses, 300*l.*; 3 and 5, Wakefield-st., Regent's-sq., u.t. 10 yrs., g.r. 12*l.*, r. 84*l.*, 370*l.*; 36 and 37, Margaret-st., Clerkenwell, u.t. 24 yrs., g.r. 40*l.*, r. 64*l.*, 125*l.*—By *H. V. Chew*: 1, Drayton-ter., Leytonstone, u.t. 85 yrs., g.r. 5*l.*, 625*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.	ton	9/0/0 — 0/0/0
Teak, E.I.	load	10/10/0 — 15/0/0
Sequoia, U.S.	ft.cu.	2/3 — 3/0
Ash, Canada	load	2/10/0 — 4/0/0
Birch, do.		3/5/0 — 4/10/0
Elm, do.		3/10/0 — 4/15/0
Fir, Pantsic, &c.		2/0/0 — 3/10/0
Oak, do.		3/0/0 — 5/5/0
Canada		5/10/0 — 7/0/0
Pine, Canada red		2/10/0 — 3/10/0
Do, yellow		2/10/0 — 5/0/0
Lath, D'ntsic, fath		5/0/0 — 6/0/0
St. Petersburg		5/0/0 — 7/0/0
Deals, Finland, 2nd & 1st std	100	8/10/0 — 10/10/0
Do, 4th & 3rd		7/10/0 — 8/10/0
Do. Riga		8/10/0 — 8/0/0
St. Petersburg, 1st yellow		11/0/0 — 15/0/0
Do. 2nd yellow		8/10/0 — 10/0/0
Do. white		7/10/0 — 10/10/0
Swedish		7/15/0 — 10/0/0
White Sea		8/10/0 — 18/0/0
Canada, Pine 1st		20/0/0 — 26/0/0
Do. do. 2nd		14/10/0 — 16/0/0
Do. do. 3rd, &c.		8/0/0 — 10/5/0
Do. Spruce, 1st		9/10/0 — 11/0/0
Do. do. 3rd & 2nd		6/15/0 — 8/0/0
New Brunswick		7/0/0 — 7/10/0
Battens, all kinds		3/10/0 — 15/10/0
Flooring Boards, sq., 1 in. prep. 1st		0/8/6 — 0/14/6
Do. 2nd		0/7/6 — 0/11/6
Other qualities		0/4/6 — 0/8/0
Cedar, Cuba	ft.	/3½ — /4½
Honduras, &c.		/3½ — /4
Mahogany, Cuba		/4½ — /6½
St. Domingo, cargo av		/4½ — 2/0
Mexican do. do		/4 — /5
Tobasco do. do		/5½ — /7
Honduras do.		/5½ — /6½
Box, Turkey	ton	4/0/0 — 15/0/0
Rose, Rio		10/0/0 — 20/0/0
Bahia		9/0/0 — 18/0/0
Satin, St. Domingo	ft.	0/0 8 — 0/1/3

TIMBER (*continued*).		
Satin, Porto Rico		0/0/8 — 0/1/6
Walnut, Italian		0/0/3½ — 0/0/7
METALS.		
IRON—Pig, in Scotland	ton	2/0/11 — 2/1/6
Bar, Welsh, in London		6/0/0 — 6/10 0
Do. do at works in Wales		5/10/0 — 6/0/0
Do. Staffordshire, in London		6/5/0 — 6/15/0
COPPER—British, cake and ingot		50/0.0 — 50 10/0
Best selected		51/0/0 — 51 10/0
Sheets, strong		60/0·0 — 0 0/0
Chili, bars		47.7 6 — 47/15/0
YELLOW METAL	lb.	0 0/5 — 0/0/5⅜
LEAD—Pig, Spanish	ton	10/17/6 — 11/0 0
English, com. brands		11/2 6 — 11/5/0
Sheet, English, 4 lbs. per sq. ft. and upwards		13.0/0 — 0/0/0
Pipe		13/10 0 — 0/0/0
ZINC—English sheet	ton	25/5/0 — 0/0/0
Vieille Montagne		25 15 0 — 0/0/0
TIN—Straits		89 2 6 — 89/5 0
Australian		84/5.0 — 89 7/6
English Ingots		92/10/0 — 92/15/0
OILS.		
Linseed	ton	18/17/6 — 19/0/0
Cocoanut, Cochin		25 0 0 — 0/0/0
Do. Ceylon		22/10/0 — 22 15/0
Palm, Lagos		23/0.0 — 0/0/0
Rapeseed, English pale		25/10/0 — 26.0.0
Do. brown		23/15/0 — 0/0/0
Cottonseed ref.		18.15/0 — 0/0/0
Oleine		21/10/0 — 22/10/0
Lubricating, U.S.		4/0/0 — 5/0/0
Do. refined		5/0.0 — 10/0/0
TAR—Stockholm	barrel	0/19/0 — 1/0/0
Archangel		0/12/6 — 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Thursdays.*]

BISHOPS STORTFORD.—For additions to a cottage, Grange-road, for Mr. G. Speechly. Mr. Alfred Brett, architect:—
Glasscock & Son ..... £300 | Martin & Fuller* £529 10
* Accepted.

BISHOPS STORTFORD.—For erecting house in Thornfields-road, for Mr. J. O. Sell. Mr. Alfred Brett, architect, South-street, Bishops Stortford:—
J. & A. Handscomb £344 0 0
[No competition.]

BISHOPS STORTFORD.—For proposed alterations to a dwelling-house. Mr. Alfred Brett, architect:—
H. Champness ..... £815 0 | Glasscock & Son (too late) £750 0
Martin & Fuller ..... 769 10 | [Architect's estimate, £809.]

BOSCOMBE (Hants).—For the superstructure of the Hotel Burlington, Boscombe, Hants. Mr. Thomas E. Collcutt, architect, 36, Bloomsbury-square, London, W.C. Quantities by Mr. James Gandy, 22, Essex-street, Strand:—

	To be completed by Oct., 892.		If given till		
Gregory & Co.	£30,300	....	Sept., 1893	....	£27,650
McWilliams	29,800	....	" "	....	27,150
Holloway Bros.	27,550	....	March "	....	25,450
Saunders	26,700	....	" "	....	25,400
Jenkins	26,496	....	" "	....	25,436
W. Hoare	—	....	June "	....	27,980
Stephens, Bastow, & Co.	26,446	....	April "	....	24,999
Reed, Blight, & Co.	24,655	....	" "	....	24,400
J. T. Chappell	24,588	....	June "	....	22,988

BOSTON (Lincolnshire).—Accepted for the erection of a Seamen's Institute at Boston. Mr. James Rowell, architect, Boston:—
W. & H. Hinds, Boston £425 0 0

BRADFORD (Yorks).—Accepted for the erection of a congregational school at Lightcliffe. Mr. Thomas Barker, C.E., architect, 5, Bond-street, Bradford, Yorks. Quantities by the architect:—
Mason.—T. Dawson, Lightcliffe, near Halifax .. £1,600 0 0
Carpenter and Joiner.—Michael Woodhead, Lightcliffe, near Halifax 620 0 0
Plumber and Glazier.—George C. Calvert, Lightcliffe, near Halifax 315 0 0
Slater.—James Smithies, Great Horton, Bradford 199 10 0
Plasterer.—John Marshall, Hipperholme, near Halifax 111 0 0
Painter.—Hinchliffe & Hainsworth, Northowram, near Halifax 28 0

BRENTWOOD.—Accepted for the erection of small Wesleyan chapel, for the building committee. Mr. Frederick Boreham, architect, 75, Finsbury-pavement:—
G. H. Martin & Co., West Croydon £927 0 0

CANE HILL (Surrey).—For alterations at the Cane Hill Asylum, Surrey, for the London County Council. Mr. G. T. Hine, Architect:—
Potter ..... £9,962 | Reed, Blight, & Co. £8,995
Faulkner ..... 9,789 | Peters 8,697
Doyley & Co. ..... 9,362 |

COLWALL (near Malvern).—For alterations and additions to Stretton Lodge, for Mr. R. Cave Browne-Cave. Mr. C. H. Godsell, architect:—
J. Lloyd ..... £657 | W. P. Lewis & Co. (accepted) £600
[All of Hereford.]

GUILDFORD.—For the main drainage of the Borough of Guildford, and also works of sewage disposal. Mr. C. Nicholson Lailey, engineer, Westminster:—
W. Cunliffe, Kingston-on-Thames (accepted) .. £27,325 0 0

HEREFORD.—For pulling-down and rebuilding the Wellington Hotel," for Mr. Thos. Yapp. Mr. C. H. Godsell, architect:—
Jas. Lloyd ..... £1,090 | L. Bowers & Co. £1,075
Thos. Lewis ..... 1,090 | W. P. Lewis & Co. (accepted) 1,035
[All of Hereford.]

HORNSEY.—For new sewers, for the Hornsey Local Board. Mr. T. de Courcy Meade, Engineer:—
Archway-road to Hampstead-lane.
John Neave ..... £14,236 | James Dickson £10,053
Leonard Foster ..... 11,117 | T. G. Dunmore 9,823
Thomas Adams ..... 10,956 | J. Bentley 8,903
Killingback & Co. ..... 10,724 | B. Cooke & Co., Battersea* 7,959
* Accepted.
Globe Estate.
John Neave ..... £3,166 | J. Bentley £2,273
Leonard Foster ..... 2,876 | B. Cooke & Co. 2,068
Thomas Adams ..... 2,709 | T. G. Dunmore, Crouch End (accepted) 1,959
James Dickson ..... 2,500 |
Crouch-hill Estate.
John Neave ..... £898 | John Bentley £602
Thos. Adams ..... 767 | B. Cooke & Co. 602
Leonard Foster ..... 767 | T. G. Dunmore, Crouch End* 497
Jas. Dickson ..... 752 | * Accepted.

HORNSEY.—For various improvement works, for the Hornsey Local Board. Mr. T. de Courcy Meade, Engineer:—
Brittles-hill, Muswell Hill-road.
J. Mowlem & Co. ..... £2,334 | Thos. Adams £2,235
Sidney Hudson ..... 2,294 | B. Cooke & Co., Battersea* 1,762
* Accepted.
Colney Hatch-lane.
Thos. Adams ..... £976 | Sidney Hudson 887
John Mowlem & Co. ..... 955 | B. Cooke & Co., Battersea* 798
* Accepted.
Crouch-hill.
Thos. Adams ..... £783 | J. Mowlem & Co. £706
Sidney Hudson ..... 763 | B. Cooke & Co., Battersea* 658
* Accepted.
Muswell Hill-road (near Wood-lane).
Sidney Hudson ..... £705 | J. Mowlem & Co. £610
Thos. Adams ..... 670 | B. Cooke & Co., Battersea* 514
* Accepted.
Park House-road.
Sidney Hudson ..... £636 | J. Mowlem & Co. £599
T. Adams ..... 607 | B. Cooke & Co., Battersea* .. 477
* Accepted.
Tottenham-lane.
Sidney Hudson ..... £432 | T. Adams £406
J. Mowlem & Co. ..... 414 | B. Cooke & Co., Battersea* .. 341
* Accepted.

HORNSEY.—For sewering and making up new streets. Mr. T. de Courcy Meade, M.Inst.C.E., Engineer:—

Roads.	Contractors. J. Mowlem & Co., Westminster.	Thos. Adams, Wood-green.	B. Cooke & Co., Battersea.	John Neave, Forest-hill, E.	Sidney Hudson, West Dulwich.
	£	£	£	£	£
Coleridge-road (2nd section)	2,553	2,475	2,142*	2,445	—
Bryanstone-road (1st section)	1,150	1,081	985*	1,100	—
Berkeley-road (2nd section)	1,065	1,021	893*	1,010	—
Birchington-road (2nd section)	1,740	1,630	1,442*	1,627	—
Glasslyn-road (1st section)	891	857	753*	870	—
Edison-road (2nd section)	594	563	499*	572	592
Onslow-gardens (1st section)	2,524	2,454	2,143*	2,488	—
Sanhope-road (1st section)	3,674	3,793	3,309*	3,825	3,400
North-grove	1,049	1,076	919*	1,110	—
Wightman-road (6th section)	97	90*	114	104	—
Barrington-road (1st section)	1,039	1,000	917*	1,030	982
Nelson-road (1st section)	2,150	1,976	1,898*	2,014	—
Harold-road (2nd section)	995	868	836*	950	882
Glebe-road (1st section)	366	323	314*	344	336
Dickenson-road (2nd section)	1,079	1,036	915*	1,008	—
Haringey-passage (2nd section)	115*	172	147	194	—

* Accepted.

HORNSEY.—For erecting gardener's cottage, Middle-lane, and park-keeper's cottage, Barrington-road, for the Hornsey Local Board. Mr. T. de Courcy Meade, M. Inst. C.E., Engineer:—

	Gardener's Cottage.		Park-keeper's Cottage.
J. Willmott & Son	£906	.....	£761
Marchan & Hirst	719	.....	670
E. Kerry & Son	700	.....	650
Pearce & Co.	709	.....	650
Scarth & Harris	680	.....	617
Geo. J. Hosking	666	.....	627
Gardner & Hazell	631	.....	595
John Groves	631	.....	605
Hy. Faulkner, jun.	625	.....	589
Edward Hughes, Stroud Green	518*	.....	564*

* Accepted.

LONDON.—For road-making and paving works, for the Vestry of the Parish of Fulham. Mr. W. Sykes, New Streets Surveyor:—

—	Parry.	Rogers & Co.	Nowell & Robson.	Mowlem & Co.	Tones & Wimpey.	Imperial Stone Co.	Greenham.	T. Adams.	Victoria Stone Co.
	£.	£.	£.	£.	£.	£.	£.	£.	£.
Princes Mews:—									
Road and Footway	435	—	377	349	264	—	—	—	—
Mornington Avenue:—									
Roadway	610	543	640	515	525	—	497	695	—
York stone	—	206	206	225	199	—	—	—	—
Victoria stone	—	—	—	216	—	—	—	—	180
Imperial stone	—	—	—	197	—	—	—	—	—
Patent adamant stone	—	—	—	207	—	—	—	—	—
Stuart's Granolithic stone	—	—	—	207	—	—	—	—	—
Kinnoul-road:—									
Roadway	550	550	642	578	534	—	535	626	—
York stone	—	297	298	314	292	—	—	—	—
Victoria stone	—	—	—	299	—	—	—	—	253
Imperial stone	—	—	—	270	—	224	—	—	—
Patent adamant stone	—	—	—	284	—	—	—	—	—
Stuart's Granolithic stone	—	—	—	284	—	—	—	—	—
Wandsworth-bridge-road, Sec. V.:—									
Roadway	—	—	1189	1240	1220	—	—	1494	—
York stone	—	—	743	745	725	—	—	—	—
Victoria stone	—	—	—	708	—	—	—	—	628
Imperial stone	—	—	—	634	—	565	—	—	—
Patent adamant stone	—	—	—	671	—	—	—	—	—
Stuart's Granolithic stone	—	—	—	671	—	—	—	—	—

LONDON.—For alterations and additions to bank premises, High-road, Tottenham, N., for the London & Provincial Banking Company. Mr. A. R. Barker, architect, 11, Buckingham-street, Strand, W.C. Quantities by Messrs. Young & Brown:—
A. Monk ..... £2,100 | P. Hart £1,744
Wheeler ..... 1,869 | J. Giles 1,721
A. Porter ..... 1,799 | H. Knight & Son 1,716
M. A. Humphreys ..... 1,7c6 | J. Groves 1,587

LONDON.—For building fourteen villas in Rosenthal-road, Rushey Green, Catford. Mr. Albert L. Guy, architect, 78, High-street, Lewisham:—
Kennard, Lewisham (accepted) £6,300 0 3

LONDON.—For pulling down and rebuilding "The Castle" public-house, High-street, Lewisham, S.E., for Mr. T. W. Watts. Mr. Albert L. Guy, architect, 78, High-street, Lewisham:—
Kennard ..... £3,200 | Knight £2,750
J. O. Richardson ..... 2,979 | S. J. Jerrard, Lewisham* 2,669
Holloway ..... 2,870 | * Accepted.
For Fittings.
Sanders & Sons, High Holborn (accepted) £812 0 0

LONDON.—For erecting stabling, &c., in rear of Nos. 321-327, Walworth-road, S.E., for Messrs. Cariage & Lidle. Mr. Albert L. Guy, architect, 78, High-street, Lewisham:—
Kennard, Lewisham (accepted) £523 0 0

LONDON.—For carrying out certain alterations and additions to the "Hare and Billet" public-house, Blackheath, for Mr. Coppinger. Mr. Albert L. Guy, architect, 78, High-street, Lewisham:—
Kennard ..... £815 | Robson £750
S. J. Jerrard ..... 790 | Knight, Sidcup (accepted) .. 729

LONDON.—For rebuilding Nos. 151 and 152, Upper-street, Islington, for Mr. Thompson. Messrs. Fuller & Fuller, architects, 70, Queen-street, Cheapside, E.C.:—
Austin ..... £3,400 | E. Houghton & Son £2,577
Mollett ..... 2,895 | King 2,190

LONDON.—For structural alterations (*A*) and internal fittings (*B*) at No. 1, Giltspur-street, E.C., for Messrs. Arnold & Sons. Mr. E. Haslehurst, architect, 7A, Laurence Pountney-hill, E.C.:—

	A.	*B.*
Young & Lonsdale	£336 0 0	£436 0 0
Drew & Cadman	—	420 0 0
Yardley & Sons	317 0 0	413 0 0
Lidstone & Son (accepted)	343 0 0	298 0 0

LONDON.—For re-building the "Cross Keys" public-house, Erith for Messrs. Truman, Hanbury, Buxton, & Co. Mr. Bruce J. Capell architect, 70, Whitechapel-road, E.:—
H. L. Holloway ..... £2,639 | Jerrard* £2,393
Young & Lonsdale ..... 2,397 | * Accepted.

LONDON.—For the erection of warehouse and offices at Narrow-street, Limehouse. Mr. M. N. Inman, architect:—
H. Izor ..... £6,651 | J. Grover & Son £5,794
T. Boyce ..... 6,540 | Patman & Fotheringham 5,773
Holloway Bros. ..... 6,078 | J. Simpson & Son 5,750
J. Chessum & Sons ..... 5,995 | W. Shurmur 5,697
Clark & Bracey ..... 5,894 | Brown, Son, & Blomfield .. 5,650
Pink, Flower, & Co. ..... 5,845 | J. H. Johnson 5,430

LONDON.—For building stables at Mile End, for Messrs. Carter, Paterson, & Co. Mr. W. Eve, architect:—
Godfrey & Son ..... £847 | W. Shurmur £794
Chafen ..... 826 | T. Salt 792
J. Chessum ..... 795 | Harris & Wardrop 783

LONDON.—For the erection of stabling and depot at Fulham, S.W., for the London Parcels Delivery Co., Limited. Mr. Henry Poston, F.S.I., architect, 39, Lombard-street, E.C.:—
T. Rider & Son ..... £3,336 | J. Mears £3,070
J. Morter ..... 3,198 | B. E Nightingale 2,974
M. Patrick & Son ..... 3,137 | Woodward & Co. 2,925
W. E. French & Co. ..... 3,130 | W. Shurmur (accepted) .. 2,920
[Architect's estimate, £2,906.]

LONDON.—For the construction of tunnel at Roll's-buildings, Fetter-lane, E.C., for the London Parcels Delivery Company, Ltd. Mr. Henry Poston, F.S.I., architect, 39, Lombard-street, E.C.:—
W. Shurmur.—Accepted on schedule of prices.

LONDON.—For re-instating warehouse at Tottenham-road, Kingsland-road, after fire. Mr. J. Hamilton, architect:—
S. Goodall ..... £1,313 | W. Shurmur (accepted) £1,289

LONDON.—Accepted for alterations and additions to Wesleyan chapel, New North-road, E.C. Mr. Frederick Boreham, architect, 75, Finsbury-pavement:—
G. H. Martin & Co., West Croydon £1,149 0 0

LONDON.—For alterations and fittings at the "Mail Coach," Farringdon-street, E.C., for Mr. Coyle. Mr. G. Hardy, surveyor:—

Tibbetts & Co.	£325	Pringle	£219
Lawrence	241	H. & F. Fearman	191
Todd	220	Silk (accepted)	189

LONDON.—For alterations to No 416, Harrow-road, for the London and South-Western Bank, Limited. Messrs. Truefitt, architects, 5, Bloomsbury-square, London. Quantities by Messrs. M. Evans & Son:—

Pryor	£1,880	J. Hunt	£1,645
Tennant	1,832	Scharien	1,543
G. Stuart	1,764	G. Bryan & Son (accepted)	1,547

MILLBROOK (Cornwall).—For proposed new church at Millbrook, Cornwall. Mr. Geo. H. Fellowes Prynne, architect, 6, Queen Anne's-gate, London. Quantities by Mr. R. Henry Hale, 6, Duke-street, Adelphi:—

Luscombe & Son	£5,480 0 0	Reed, Blight, & Co.	£4,300 0
F. Merrick & Sons	5,214 14 0	Ambrose Andrews	4,250 0 0
James Julian	4,614 0 0	Isaac Rosekilly	4,192 7 10
Tozer & Sons	4,594 0 0	Lapthorne & Goad	4,000 0 0
Stephens, Bastow, & Co	4,432 0 0		

NEW TREDEGAR.—For building new church, at New Tredegar, for the Rev. Thos. Theophilus. Messrs. Seddon & Carter and Messrs. James & Morgan, joint architects, Cardiff:—

Bowers	£3,395	H. Welsh	£3,000
Haines	3,025	Stephens, Bastow, & Co.	2,946
Osborne & Co.	3,011	Williams & Son	2,656

POTTERS BAR (Middlesex).—For erection of dwelling-house, stables, &c., at Potters Bar, for the Rev. F. W. Poland. Messrs. Marshall & Vickers, architects:—

Voller	£2,718	Meskin	£2,586
W. Shurmur	2,643	Bell & Son	2,584

SUNNINGDALE.—For the erection of a rectory for St. Alban's Church, for Mr. C. D. Kemp Welch. Messrs. Truefitt, architects, 5, Bloomsbury-square, London:—

Walker	£825 0 0
J. Norris & Sons (accepted)	690 0 0

TOTLAND BAY (Isle of Wight).—For the construction of a sewerage system, for the Isle of Wight Rural Sanitary Authority. Mr. W. Lidstone, engineer, 12, Victoria-street, Westminster, London, S.W:—

James Dickson	£7,054 0	James Ball & Son, Cowes, Isle of Wight*	£3,182 0
W. Fortescue	5,615 10		

* Accepted provisionally.

WELWYN (Herts).—For erecting villa residence at Welwyn, Herts, for Mr. Thomas B. Blows. Mr. Ellis Raves, architect, Welwyn:—

Wm. Lawrence & Sons	£720 0	Wilmott	£615 0
James	675 0	Johnson	587 0
Foster	633 0	Ruffell	487 15

[Architect's estimate, £600.]

WELWYN (Herts).—For erecting residence at Welwyn, Herts, for Mr. Wm. Hitchcock. Mr. Ellis Raves, architect, Welwyn:—

Lawrence & Sons	£681	Foster	£585
James	645	Wilmott	560
Johnson	597	Ruffell	499

[Architect's estimate, £500.]

WEST GREEN (Middlesex).—For erecting new parish room, West Green. Mr. Geo. H. Fellowes Prynne, architect, 6, Queen Anne's-gate, Westminster. Quantities by Mr. R. Henry Hale, 6, Duke-street, Adelphi:—

J. Carmichael	£3,100 0 0	G. L. Wilson & Co.	£2,045 0 0
G. Gray	2,404 0 0	H. Knight & Son	2,030 0 0
J. Stewart	2,355 0 0	P. Hart, West Green*	1,996 0 0
J. & C. Bowyer	2,224 0 0	C. C. Brown	1,963 10 11

* Conditionally accepted.

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AS MORE than one Firm Possess Cartoons of mine, I find it necessary to state that I have ESTABLISHED my own GLASS WORKS in Hampstead, and am no longer responsible for the execution of any work not entrusted to me personally.—Signed, HENRY HOLIDAY, Oak Tree House, Branchhill, Hampstead, N.W.

QUANTITIES.
Architects, Builders, &c, seeking COMPETENT SURVEYORS, and wanting work well done, should address, Branch, 25, CHEAPSIDE, E.C.

NOTICE of REMOVAL.—The OFFICE of the LONDON SANITARY PROTECTION ASSOCIATION is REMOVED from 1, Adam-street, Adelphi, W.C. to 21, GREAT GEORGE STREET, WESTMINSTER, S.W.
WM. SMITH, Secretary Lon. San. Pro. Association.
March 19th, 1892.

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beg to announce that they have
REMOVED their OFFICES from 1, Finsbury-circus, E.C.
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No. 22, GREAT JAMES STREET, BEDFORD ROW, W.C.

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RICHARD EVANS, Deceased.—Notice is hereby given that all Creditors and other persons having any Claims or Demands against the estate of RICHARD EVANS, late of Nos. 14 and 16, Penrose-street, Walworth, in the county of Surrey, Retired Builder, deceased, who died on the 4th day of January, 1892, and whose will was proved in the Principal Registry of the Probate Division of Her Majesty's High Court of Justice on the 12th day of March, 1892, by William Evans and Edward Walter Haines, the Executors therein named, are hereby required to send the particulars in writing of their claims or demands to me, the undersigned, on or before the 1st day of MAY, 1892, after which date the said Executors will proceed to distribute the assets of the said deceased amongst the persons entitled thereto, having regard only to the claims and demands of which they shall then have had notice; and they will not be liable for the assets of the said deceased, or any part thereof, so distributed to any person or persons of whose claims or demands they shall not then have had notice.

Dated this 17th day of March, 1892.
EDWARD WALTER HAINES,
10, Serjeant's Inn, Fleet-street, E.C.
Solicitor for the said Executors.

THE TEDDINGTON LOCAL BOARD require the SERVICES of a competent CLERK of WORKS, experienced in sewer work. Applications to be made in writing, with copies of testimonials, and stating salary required, not later than 4th APRIL next.
By order,
HENRY YORK, F.S.I.
Engineer to the Board.
Town Hall,
Teddington,
March 22nd, 1892.

CITY of BIRMINGHAM.
WANTED, a good active ROAD FOREMAN to take charge of a section of Paved and Macadamised roads in this City. He will have to superintend the men and horses employed, and keep account of the same. He must be sober, and have a good knowledge of road work.
Wages, 2*l.* per week.
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JOHN T. BUCKLEY,
Road Surveyor.
Road Surveyor's Office,
The Council House,
March 15th, 1892.

CIVIL SERVICE COMMISSION.—Forthcoming EXAMINATIONS.—Draughtsman, Admiralty, Outports (24-30) 13th April, Assistant Examiner, in the Patent Office (21-25) 13th April. The dates specified are the latest at which application can be received. They must be made on forms, to be obtained, with particulars, from the SECRETARY, Civil Service Commission, London, S.W.

THE RUGBY LOCAL BOARD require a GENERAL FOREMAN. He must be a practical man, accustomed to the laying of sewers and water-mains, the supervision of paving works, the maintenance, repair, and cleansing of macadamised roads, and the superintendence of workmen.
Salary 1*l.* 5*s.* per week, with house, coal, and gas. He will be required to live on the premises, and take charge of the Offices, &c. with an allowance for cleaning same.
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SURVEYOR'S ASSISTANT WANTED, for a temporary Engagement. One who is quick and smart at taking measurements of work, and abstracting and billing. Preference to one used to the War Office Schedule.—Apply, stating experience and salary, to X. Y. Z. care of Eason & Sons, Limited, Advertising Agents, Dublin.

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A VACANCY occurs in Provincial Town 40 miles out of London for a BUILDER'S CLERK. Must be well up in taking off quantities, pricing estimates, and able to measure against surveyors, and finally adjust accounts. Permanency for competent man. Security will be required. Salary at commencement, 50s. per week. State age, and full particulars as to recent employment.—Box 279, Office of "The Builder."

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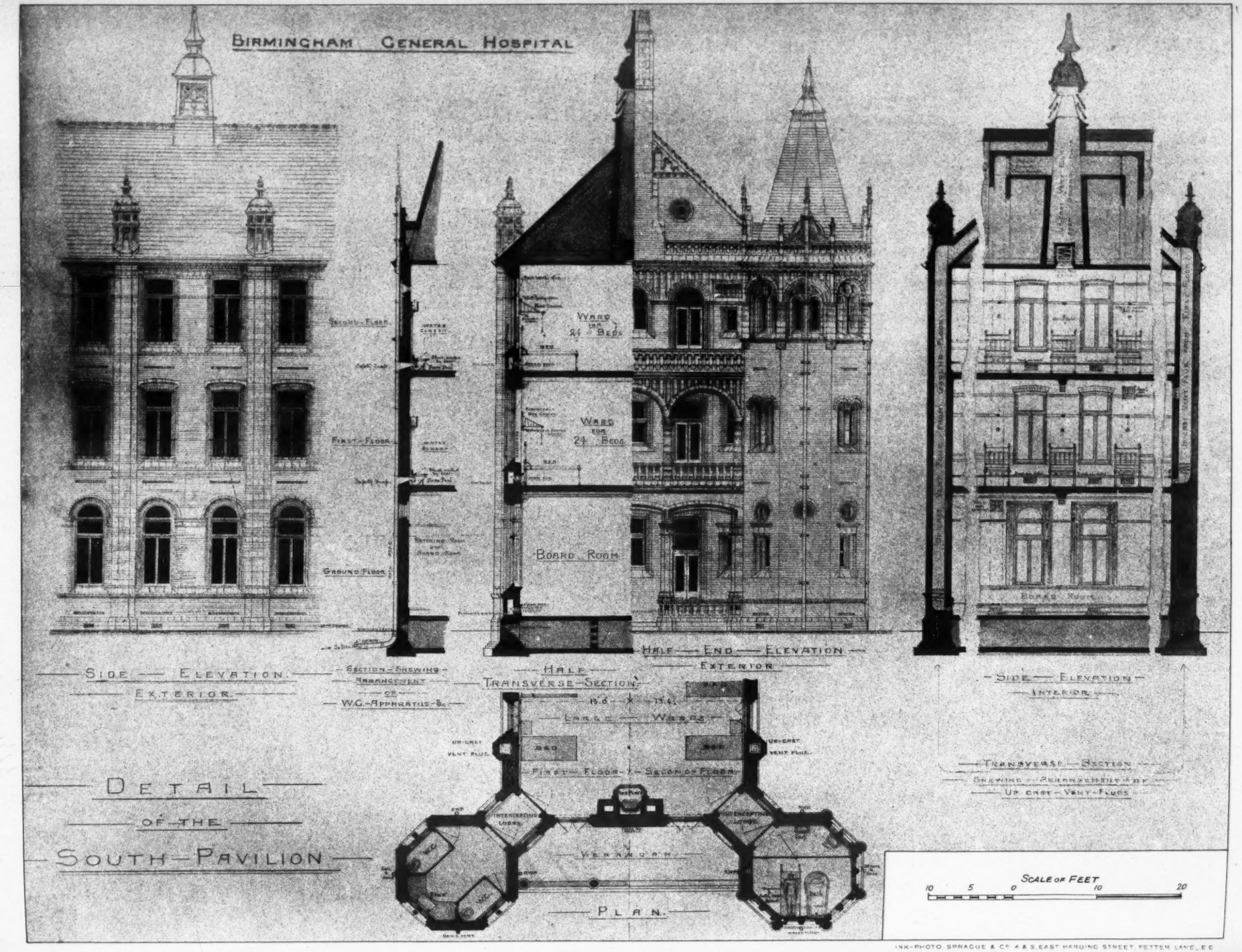
NEW PREMISES, COPTHALL AVENUE.—Mr. T. Barnes Williams, Architect.



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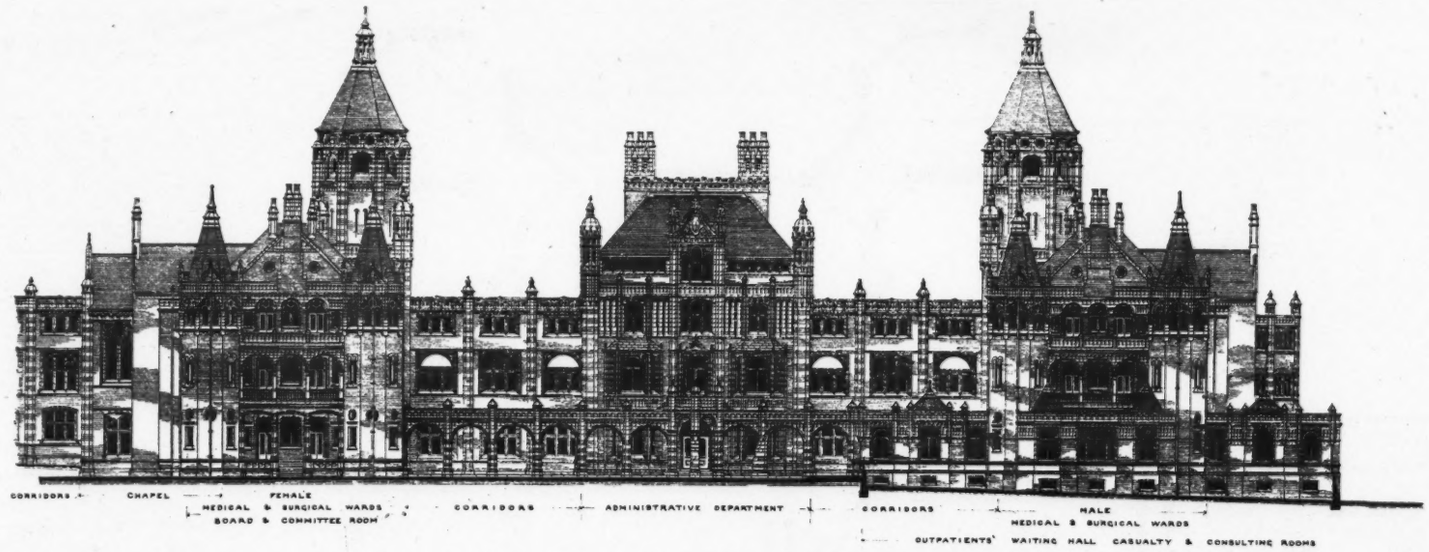

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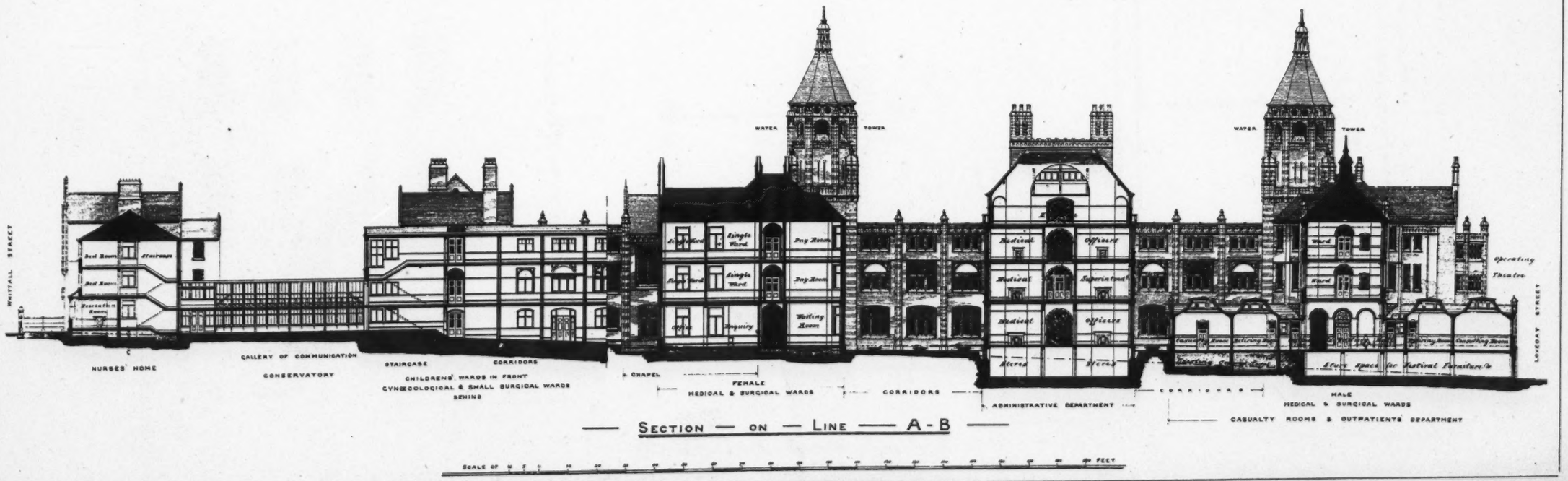

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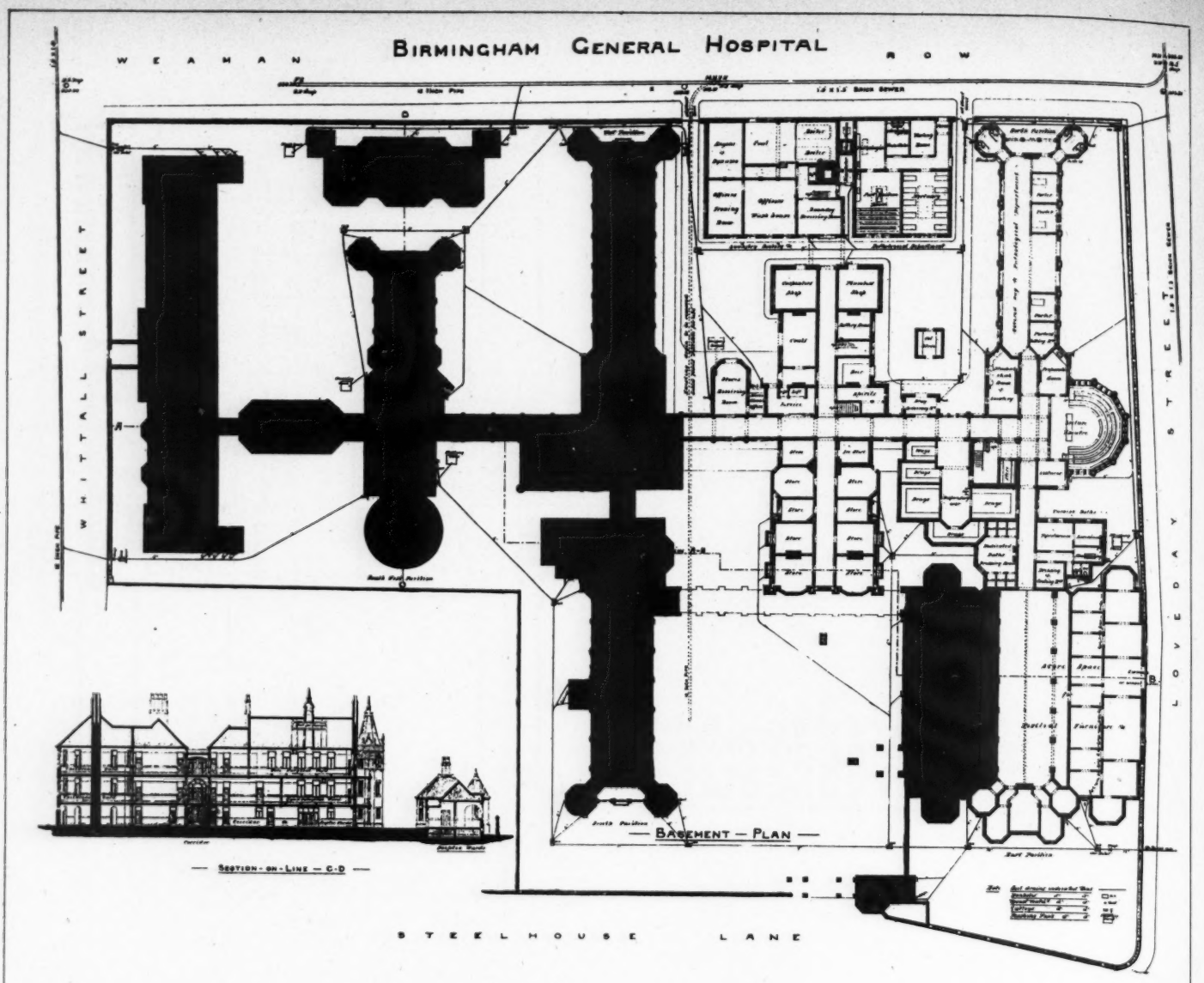

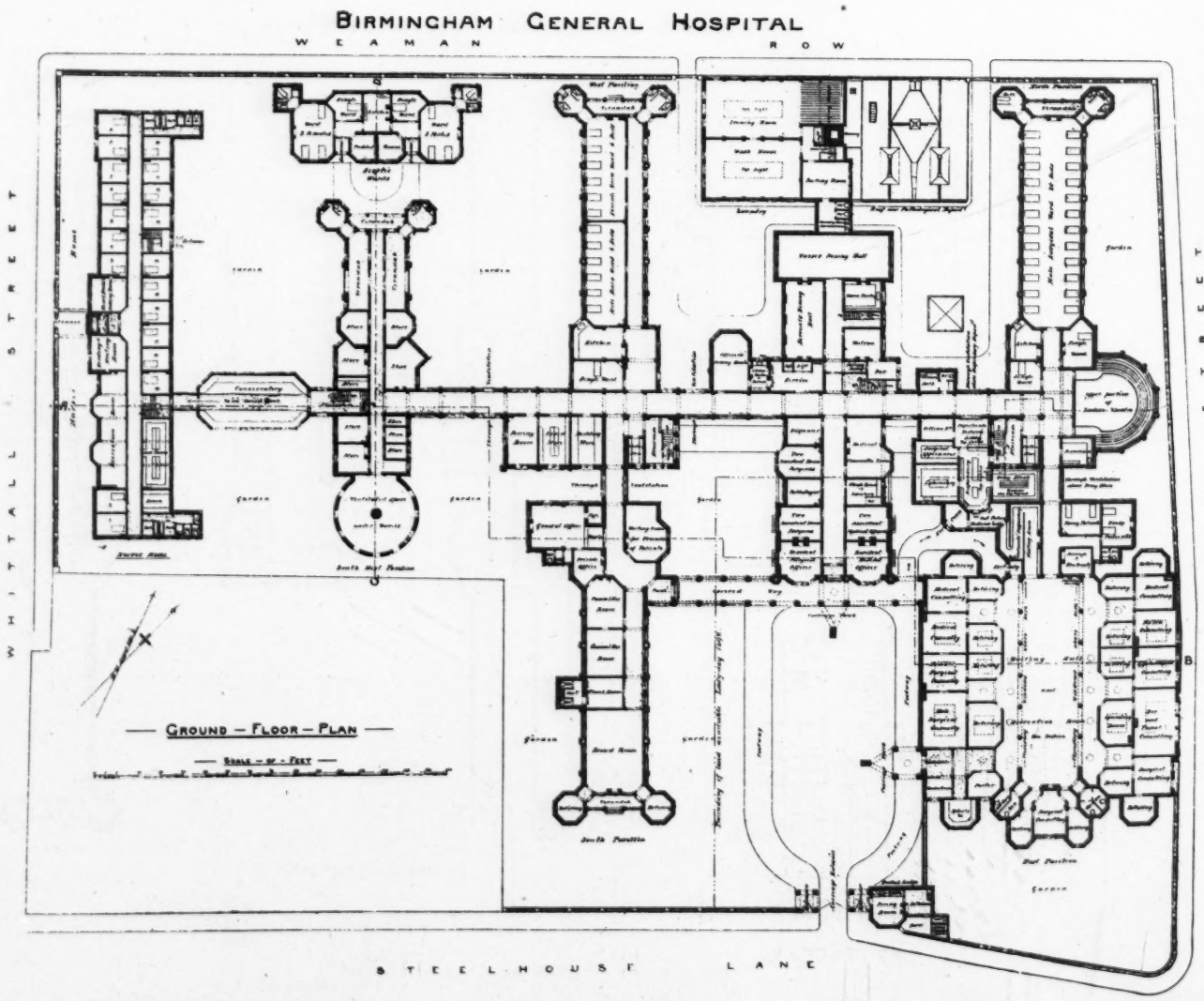

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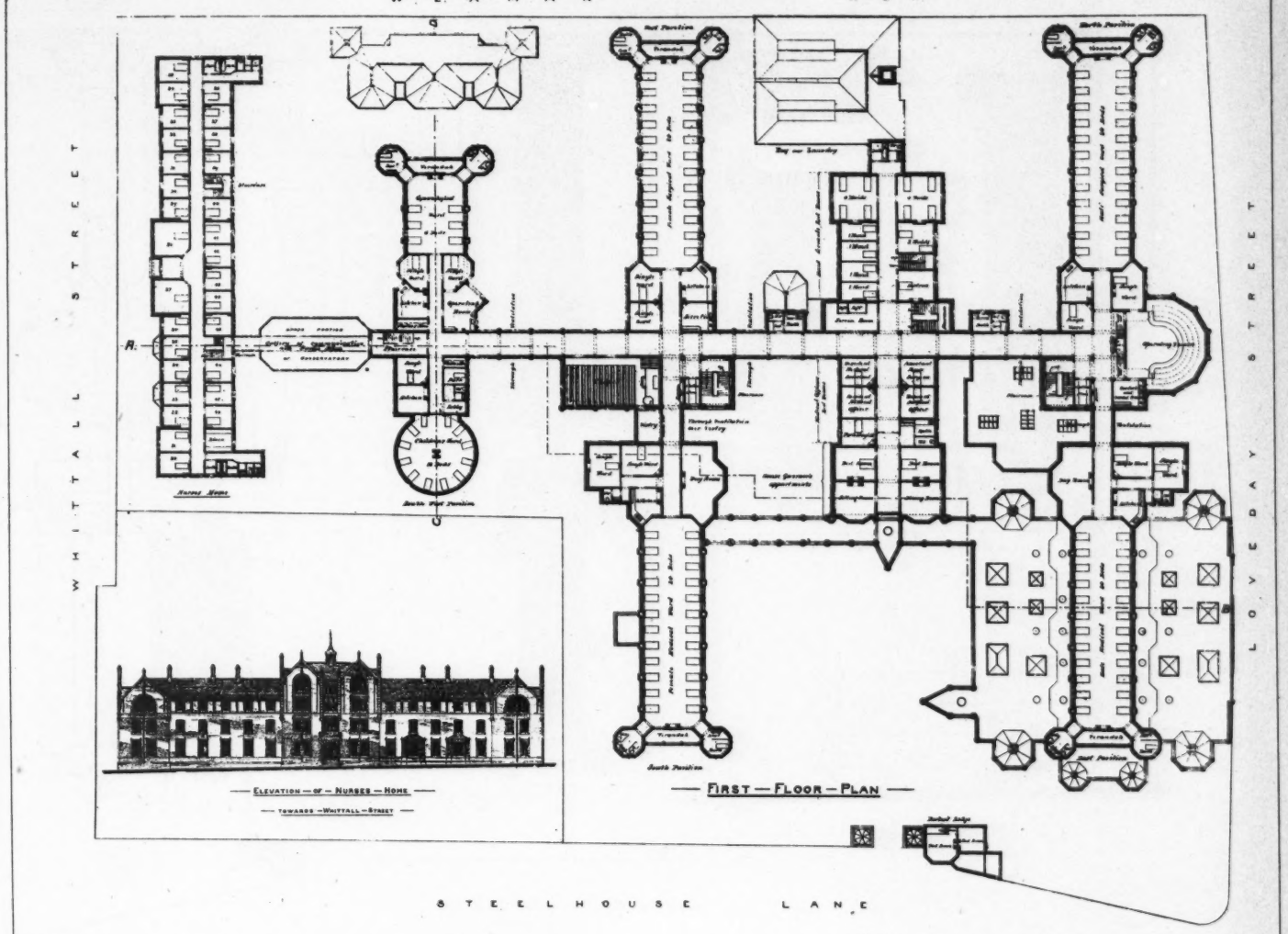

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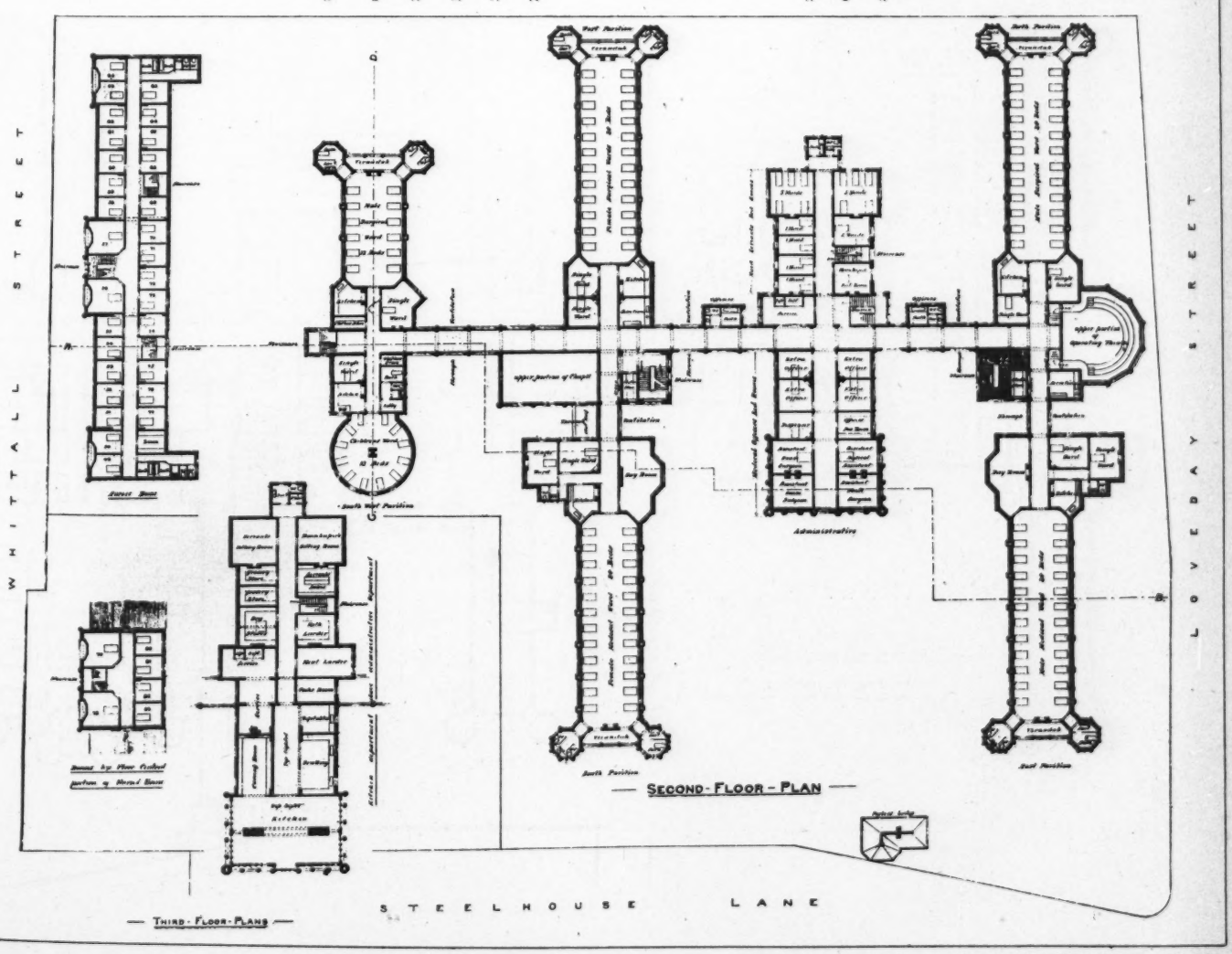

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